University of Alberta

Opportunities and challenges for the pursuit of sustainability under globalization: A study from Costa Rica

by

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Dedication

To the future children of Guanacaste and to mine - may we pass
you a place that you are proud to call home;
and
To Greg – you know why. Thank you.

Abstract

Globalization and human-domination of the globe have increased the complexity, scope and pace of human-environment interactions in ways that have fundamentally reconfigured the opportunities and challenges for sustainability. As a result, what society needs from science has shifted. Society and scientists alike now call for new ways of doing science that can support decision-makers to confront the complexity and uncertainty of sustainability in today's more globalized world.

The research presented in this thesis contributes to answering this call. The goal of the research was to examine complexities in how globalization shapes the opportunities and challenges for pursuing sustainability. It was conducted in a region of the world where human-environment interactions have been fundamentally transformed by globalization: Latin America.

The research used a two-tiered, qualitative case study approach to examine environmental policy-making in Costa Rica and land-use management in Costa Rica's dry North West. It had three specific objectives:

1. To analyse how environmental policy-making in Costa Rica was influenced by the transfer of policy ideas between the international and Costa Rican political systems;

2. To trial a novel methodology for conducting qualitative land-use research that can support natural resource managers to pursue sustainability while maintaining a high level of scientific credibility; and,

3. To examine the specific processes of forest recovery and rural livelihood change in Costa Rica's dry North West, and their implications for sustainability and forest management.

This research makes three key contributions to our understanding of interactions between globalization, sustainability and complex social-ecological systems. First, it counters a tendency towards oversimplification in both theories and solutions for sustainability. It shows that neither generalized large-scale theories nor single blueprint solutions are adequate on their own to address the complex reality of environmental policy-making and land-use management in Costa Rica today. Second, it demonstrates how the potential of qualitative research to support natural resource managers can be more fully realized through methodological innovation. Third, it reveals important ways that environmental policy-makers and natural resource managers can avoid the pitfalls of oversimplification to more directly confront the complexities of pursuing sustainability under globalization.

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List of Abbreviations

ACG	*Área de Conservación Guanacaste* (Guanacaste Conservation Area)
ADI	*Asociación de Desarrollo Comunal* (Community development association)
CATIE	*Centro Agronómico Tropical de Investigación Enseñanza* (Tropical Agricultural Research and Higher Education Centre)
CNP	*Consejo Nacional de Producción* (Costa Rican National Production Council)
CORFOGA	*Corporación de Fomento de la Ganadería* (Cattle Ranching Advocacy Corporation)
DINADECO	*Dirección Nacional de Desarrollo Comunal* (Costa Rican National Directorate for Community Development)
ECODES	*Estrategia de Conservación para el Desarrollo Sostenible* (Costa Rican Strategy of Conservation for Development)
FAO	Food and Agriculture Organization of the United Nations
FCGG	*Federación de Cámaras de Ganaderos de Guanacaste* (Federation of Guanacaste Cattlemen's Chambers)
FONAFIFO	*Fondo Nacional de Financiamiento Forestal* (Costa Rican National Forestry Financing Fund)
FTT	Forest Transition Theory
IDA	*Instituto de Desarrollo Agrario* (Costa Rican Institute of Agrarian Development)
IMF	International Monetary Fund
INEC	*Instituto Nacional de Estadística y Censo* (Costa Rican National Institute of Statistics and Census)
LUCC	Land-use/ land-cover change
MAG	*Ministerio de Agricultura y Ganadería* (Costa Rican Ministry of

	Agriculture and Livestock)
MINAE	*Ministerio del Ambiente y Energía* (Costa Rica Ministry of Environment and Energy)
MMBIEN	Mainstreaming Market Based Instruments for Environmental Management (World Bank sponsored project in Costa Rica)
OCIC	*Oficina Costarricense de Implementación Conjunta* (Costa Rican Office of Activities Implemented Jointly)
PES	Payments for environmental/ecosystem services
PRA	Participatory rural appraisal
PSA	*Pago de Servicios Ambientales* (Costa Rican Payments for Environmental Services program)
PTA	Policy transfer analysis
RRA	Rapid rural appraisal
SINAC	*Sistema Nacional de Áreas de Conservación* (Costa Rican National System of Conservation Areas)
USAID	United States Agency for International Development

1 Introduction

> *We geographers are [people] of many creeds and tongues. We have plenty to say, but we seldom say it in unison or in harmony.*
>
> \- G. H. T. Kimble

1.1 Introduction

The pursuit of sustainability in today's human-dominated and globalized world is one of the greatest challenges facing humanity in the twenty-first century. Sustainability entails a balance between human subsistence, production and lifestyle needs and the maintenance of important environmental services that support human and non-human life (Clark, 2007; Kates, et al., 2001). Globalization has increased the pace, frequency, scope and intensity of human-environment interactions, threatening to upset this balance (Gallopin, Funtowicz, O'Connor, & Ravetz, 2001; Lubchenco, 1998). At the same time, however, globalization has opened up new avenues for confronting problems of sustainability. In short, it has reconfigured the opportunities and challenges for pursuing sustainability today compared to the past.

The dual nature of globalization – as threat and hope – frames the research project presented in this dissertation. The goal of the research was to examine complexities in how globalization influences opportunities and challenges for pursuing sustainability (see Figure 1-1). The research project focused on two important and interrelated avenues for pursuing sustainability: environmental policy-making, and the management of people's land-use. The research was conducted in a region of the world where human-environment interactions have been fundamentally transformed by globalization: Latin America (Gwynne & Kay, 2004a). It used a two-tiered case study approach that examined environmental policy-making in Costa Rica and land-use in Costa Rica's dry North West.

The specific objectives of the research were:

1) To analyse how environmental policy-making in Costa Rica was influenced by the transfer of policy ideas between the international and Costa Rican political systems;

2) To trial a novel methodology for conducting qualitative land-use research that can support natural resource managers to pursue sustainability while maintaining a high level of scientific credibility; and,

3) To examine the specific processes of forest recovery and rural livelihood change in Costa Rica's dry North West, and their implications for sustainability and forest management.

1.2 Background

1.2.1 Changing approaches to human-environment research

Human-environment research has a long history within geography, tracing back to the early work of geographers such as Alexander von Humbolt and Carl Sauer (Turner II, 2002). Human-environment interactions are an important area of research in many different scientific disciplines, including geography, economics, sociology, ecology, and anthropology. However, while research on human-environment interactions is an inherently cross-disciplinary pursuit, its association with the discipline of geography is particularly strong (Turner II, 2002; Zimmerer, 2007).

Four broad trends have renewed and fundamentally changed human-environment research. *First*, globalization and human-domination of the globe have increased the frequency, complexity, scope and pace of interactions between human and environment systems (Gallopin, et al., 2001; Lubchenco, 1998; Szaro & Peterson, 2004). In the last 40 years, the human population has more than doubled from 3 billion to almost 7 billion people (United Nations Population Division, 2008). Combined with technological advances, this has raised the capacity of humans to impact the environment on a global scale. These developments have given renewed importance and urgency to human-environment research (Clark, 2007; Kates, et al., 2001).

Second, the greater complexity of human-environment interactions today has increased the need for interdisciplinary research approaches that can study human and environment systems together (Cordell & Bergstrom, 1999; Kinzig, 2001; McMichael, Butler, & Folke, 2003; Scoones, 1999; Skole, 2004; Stewart & Schroeder, 1997; Young, et al., 2006). Complex interactions between human and environment systems cannot be understood by studying these systems in isolation of each other. This presents a serious challenge to the traditional scientific disciplines that are aligned along the divide between natural and social sciences. It requires new and more diverse theories, methodologies, institutional arrangements and avenues of communication (Adger, Brown, & Hulme, 2005; Kates, et al., 2001; McMichael, et al., 2003; Skole, 2004). It also requires efforts to overcome the significant cultural, language, epistemological and institutional barriers that exist between social and natural sciences (Cundill, Fabricius, & Marti, 2005; Stewart & Schroeder, 1997).

Third, the increasing frequency, scope and pace of human-environment interactions has raised the status and role of systemic perspectives in this research area (Gallopin, et al., 2001). Systemic perspectives typify the notion that the whole is greater than the sum of its parts. They highlight the interdependence and inseparability of multiple components within complex systems (Bell, 2005; Perz, 2007; Salomon, 1991). Systemic approaches to scientific inquiry therefore focus on examining complex systems in their entirety. This contrasts sharply with the more conventional, reductionist approaches in science (Salomon, 1991). The emergence of systemic approaches to research creates a need to develop new theories and methodologies that are better able to embrace the complexity of the new wave of sustainability challenges (Clark, 2007; Clark & Dickson, 2003; Kates, et al., 2001; Rindfuss, Walsh, Turner II, Fox, & Mishra, 2004).

Finally, and most compelling, both science and society demand that scientific research increase its contribution to solving the challenges of sustainability in today's globalized world (Cash, et al., 2003; Gallopin, et al., 2001; Lubchenco, 1998; Zimmerer, 2007). This demand was epitomized in a 1998 speech by then-president of the American Association for the Advancement of Science (AAAS), Jane Lubchenco:

> *A different application of scientific knowledge is emerging as equally important in today's world: knowledge to inform policy and management decisions ... the role of science in informing decisions is emerging as one of the critical unmet needs of society at the end of the millennium* (Lubchenco, 1998, p. 495).

A science that informs decisions calls for greater emphasis on problem-oriented, or applied, approaches in research. In problem-oriented research the goal is not only to generate new knowledge but to enable action (Clark, 2007). To do this, it needs to reach beyond the sphere of academia to engage with policy-makers, managers and the public. Again, this presents considerable theoretical and methodological challenges, not least of which is protecting the independence and rigor of scientific research from the compromising world of politics (Cash, et al., 2003; Funtowicz & Ravetz, 1993; Jasanoff, 1987; Lélé & Norgaard, 1996).

Geography is arguably better-placed to embrace the challenges posed by these shifting trends in human-environment research than any other discipline (Liverman, 2004; Skole, 2004; Zimmerer, 1994). Geography is inherently more predisposed to welcome interdisciplinarity, providing a "safe haven" for researchers escaping the greater disciplinary focus that exists elsewhere (Skole, 2004). Meanwhile, the strong tradition of human-environment research in geography, along with its attention to what is different between locations and places, give it a good foundation for examining the complexities of today's sustainability challenges (Liverman, 2004; Zimmerer, 2006).

1.2.2 Key concepts

Three key concepts are central to the work presented in this dissertation: sustainability, social-ecological systems, and globalization. These three concepts, and the interactions and linkages between them, encapsulate the complexity of human-environment interactions in today's increasingly interconnected world.

1.2.2.1 Sustainability

The definition of sustainability provided in the introduction to this chapter follows that of researchers in the emerging field of sustainability science (Clark, 2007; Clark & Dickson, 2003; Kates, et al., 2001; McMichael, et al., 2003). At its heart, sustainability represents the recognition that human activities must be undertaken in a way that does not degrade the important environmental services that maintain life. It therefore constitutes a sense of balance between human action and environmental health.

The concept of sustainability is perhaps one of the most influential and widely-shared ideas today. No one is against the idea of sustainability, and no one denies the need to make adjustments to human activities in order to pursue sustainability. The concept of sustainability frames international efforts to confront global environmental change (Mebratu, 1998) and it provides the rationale for much human-environment research (Kates, et al., 2001; Lélé & Norgaard, 1996). It has also been adopted as a guiding principle by numerous national, provincial and municipal governments (George & Kirkpatrick, 2006), as well as non-government organizations and private businesses.

Despite the importance of the sustainability concept, it remains an inherently problematic concept for three broad reasons: it is complex, contested and vague. At its simplest, the concept of sustainability refers to an ability to be maintained or to endure (OED, 1989). However, there is hidden complexity within this definition that becomes evident when one asks such questions as: What is to be maintained, for how long, by what processes, and with what trade-offs (Costanza & Patten, 1995; Lélé & Norgaard, 1996). As noted by Lélé (1996), many of the problems associated with putting sustainability into action stem from competing views and value judgments related to these more complex questions rather than from the essentially simple core idea of sustainability.

The related concept of sustainable development is also contested for its perceived role in promoting a capitalist economic agenda of growth (Turner II, 1997). It is *sustainable development* rather than *sustainability* that has become the guiding principle of international efforts to manage human-environment interactions (Mebratu, 1998; Turner II, 1997). The most widely cited definition of sustainable development was first provided in the 1987 publication of the World Commission on the Environment and Development report titled *Our Common Future* (Brundtland & World Commission on Environment and Development, 1987). This report (also known popularly as the Brundtland report) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland & World Commission on Environment and Development, 1987, p. 48). However, there is a division in the usage of the two terms of *sustainable development* and *sustainability*. Robinson (2004) notes that the term *sustainable development* is more closely associated with managerial, incremental approaches that assume economic growth is desirable. Consequently, it is the favoured term amongst international development and conservation organizations, and national governments. In contrast, academics and non-government organizations prefer the term *sustainability* because it is not associated with an assumption that growth is desirable. This difference reflects a divide in approach and ideology that reveals the contested nature of the idea of sustainability.

The concept of sustainability is also heavily criticized for its vagueness. Some suggests that the core idea of sustainability is just too simple. An outcome of this is the multitude of often conflicting definitions that exist for the single term of sustainable development (Mebratu, 1998; Mog, 2004; Turner II, 1997). Because of this vagueness, some see the concept as nothing more than a catch cry that can become all things to all people. They argue that it is incapable of shaping strong international agreement or leading to concrete action because it is used to refer to so many different and sometimes competing ideas (Mebratu, 1998; Mog, 2004; Robinson, 2004; Toman, 1994; Turner II, 1997).

1.2.2.2 Social-ecological systems

The concept of social-ecological systems developed directly out of applying systems perspectives to problems of human-environment interactions. It positions humans firmly *within* the environment, and highlights the interconnectedness, complexity and unpredictability of human-environment interactions (Bellamy, Walker, McDonald, & Syme, 2001; Berkes & Folke, 1998; Folke, Hahn, Olsson, & Norberg, 2005; Redman, Grove, & Kuby, 2004). Social-ecological systems are conceived as complex systems made up of multiple components arranged into interlinked subsystems that form at different levels (e.g. economic systems, water catchments, social networks). They are multi-scaled and self-organizing systems (Berkes, 2004; Cundill, et al., 2005; Gunderson & Holling, 2002). Larger-scale systems are made up of smaller, interlinked systems (Walker, Holling, Carpenter, & Kinzig, 2004; Young, et al., 2006). Because the components of the system are interlinked, disturbances in one part of a social-ecological system can lead to changes in other parts of the system. These changes can occur at different temporal or spatial scales from the disturbance that induced them (Berkes & Folke, 1998). An important example of this complexity and unpredictability is the link between greenhouse gas emissions and global climate change. Rises in greenhouse gas emissions are caused by many separate and varied human activities occurring at different scales and places. However, because of linkages within the global social-ecological system, these activities led to the unanticipated outcome of increasing global temperatures.

An increasing number of research fields have come to view social-ecological systems as the most appropriate unit of analysis for examining human-environment interactions. For example, it is used widely in global environmental change research (Adger, 2006; Gallopín, 2006), environmental management and conservation (Berkes, 2004; González, Montes, Rodríguez, & Tapia, 2008), environmental governance (Folke, et al., 2005; Keskitalo, 2009), and agricultural research (Milestad & Darnhofer, 2003). The rising influence of the concept reflects all four of the broad developments in human-environment research outlined above. It emerged from research aimed at addressing the urgent problems of sustainability, in particular global environmental change. It epitomizes a systems perspective of human-environment problems. It frames research that aims to enable new approaches to management. Finally, it is an inherently interdisciplinary concept.

1.2.2.3 Globalization

The concept of globalization refers to the increasing interconnection and movement of capital, goods, people, information, ideas and culture around the world (Lambin, et al., 2001; Young, et al., 2006; Zimmerer, 2006). Globalization has been a characteristic of human society since the era of conquest and colonization. However, since the beginning of the 1980s it has changed both quantitatively and qualitatively (Young, et al., 2006). Technological advances in the areas of communications, banking and transportation have increased the pace and intensity of globalization (Wolf, 2001). The increasing numbers of global actors such as transnational companies, transnational social networks, foreign investors, and supranational financial institutions have far greater influence on national policies and domestic markets than ever before (Bebbington & Batterbury, 2001; Gwynne & Kay, 2004b; Perreault & Martin, 2005). Meanwhile, local economies have become more unpredictable for local actors because markets are more dependent on external forces (Kay, 2008; Woods, 2007). Culture and lifestyle aspirations have also shifted in complicated ways as a result of television, migration and changing economic opportunities (Keeling, 2004; Swyngedouw, 2004).

While popular conceptions assume that globalization will produce a homogenised world in which differences between places and across scales are diminished (Kelly, 1999), geographic perspectives suggest that the opposite is in fact true (Bebbington & Batterbury, 2001; Escobar, 2001; Kelly, 1999; Massey, 2005; Routledge, 2003; Swyngedouw, 2004; Woods, 2007). For example, Swngedouw (2004) shows that globalization involves a re-scaling of political, economic and social power away from the national scale to both global and local scales, rather than the domination of the global level that many predict. An example of this local-global re-scaling is the increasing frequency of interactions between local groups and transnational networks that exclude national governments (Bebbington & Batterbury, 2001; Routledge, 2003). Meanwhile, Massey (2005) and others show that the changes associated with globalization occur through a process of hybridization, in which multiple strands of globalization become intertwined with local conditions and processes (Bebbington & Batterbury, 2001; Escobar, 2001; Woods, 2007). Local places are not passive recipients of global forces, rather they are recreated through active "negotiation, manipulation and hybridization" (Woods, 2007, p. 487). This work shows that what is different and particular in specific locations is not necessarily lost or diminished under globalization.

1.2.2.4 Interactions and linkages

From a systemic perspective, social-ecological systems are the most appropriate answer to the sustainability question of "what is to be maintained?" Due to the intricate interactions within social-ecological systems the sustainability (or not) of one part of the system influences the sustainability of other parts, so that the whole system must be sustained together (Holling, Gunderson, & Peterson, 2002). However, the sustainability of social-ecological systems also requires trade-offs. What is good for one part of the system is not always good for another (Walker, et al., 2004). Consequently, while "social-ecological systems" may be the answer to the sustainability question of "what is to be maintained", the related questions of: how long are they to be maintained, by what processes, and with what trade-offs, remain.

Globalization complicates sustainability by increasing the interactions between and within social-ecological systems. This exposes social-ecological systems to a greater number of externally-driven disturbances (Armitage & Johnson, 2006; Lambin, Geist, & Lepers, 2003; Reed, 2002; Young, et al., 2006). Together with global environmental change, globalization is widely viewed to be the major force for change in social-ecological systems around the globe (Young, et al., 2006). In the face of external disturbance, the key to the sustainability of social-ecological systems is resilience (Gunderson & Holling, 2002; Holling, 1993). Resilience is the ability of a system to absorb disturbances, without undergoing major structural change (Chapin, et al., 2004; Folke, 2006; Walker, et al., 2004). In human-dominated landscapes, the concept of adaptive capacity is invoked to describe the ability of humans (as individuals, groups or governments) to manage resilience (Walker, et al., 2004).

The dual nature of globalization as both threat and hope leads to different strategies to manage resilience (Olsson, et al., 2006; Walker, et al., 2004). Pursuing sustainability may focus on conserving an existing, healthy social-ecological system by managing resilience to absorb potentially damaging disturbances produced by globalization. Conversely, in the case of an unhealthy system, it may involve taking advantage of the opportunities presented by globalization to shift the social-ecological system into a new, more sustainable formation (Folke, 2006; Walker, et al., 2004). As sustainability involves trade-offs, what is deemed a healthy or desirable social-ecological system is open to different interpretations by different actors (Walker, et al., 2004). Consequently, the best strategies for managing the sustainability of social-ecological systems under globalization are often contested.

1.2.3 Globalization, neoliberalism and human-environment interactions in rural Latin America

Latin America is one region of the world that has experienced social, political and economic transformation under globalization (Gwynne & Kay, 2004a). While this region has been tied to global political and economic processes ever since the era of Spanish conquest (Barton, 2006), in the last three to four decades this globalization has taken on a particularly neoliberal flavor (Keeling, 2004; Liverman & Vilas, 2006; Perreault & Martin, 2005). Neoliberalism is a political and economic ideology characterized by an emphasis on free trade, a reduced role for the state, and privatization (Liverman & Vilas, 2006; McCarthy & Prudham, 2004; Perreault & Martin, 2005). In Latin America, globalization is partly characterized by the spread of neoliberal political and economic ideas.

Neoliberalism rose en force in Latin America in the 1990s. During this time, development strategies in Latin America shifted dramatically from State-led, internally-oriented approaches to neoliberal, market-driven approaches (Gwynne & Kay, 2004b; Kay, 2008; Keeling, 2004; Liverman & Vilas, 2006; Perreault & Martin, 2005). Supranational financial organizations like the IMF and the World Bank pushed neoliberalism in the region through conditions attached to Structural Adjustment Program (SAP) loans designed to move Latin American nations out of economic crisis (Barton, 2006; Loker, 1996; Perreault & Martin, 2005). Meanwhile, leaders in the region embraced the neoliberal policies as a response to the failure of the import-substitution model of industrialization that was prevalent in the 1980s, and because neoliberalism was associated with the emergence of democratic political systems in the region (Keeling, 2004; Liverman & Vilas, 2006; Perreault & Martin, 2005).

The effects of neoliberal globalization are particularly strong in rural areas of Latin America. It has transformed rural economies and societies to the point that authors now write of a "new rurality" (Kay, 2008) and a "global countryside" (Woods, 2007). Processes associated with this transformation include: the rapid growth of commercial/export agricultural sectors and the decline of subsistence/basic grain production (Kay, 2004; Loker, 1996); increasing privatisation of property rights (Kay, 2004; Liverman & Vilas, 2006); rural-to-urban migration (Aide & Grau, 2004; Bebbington, 2004); and an increase in non-agricultural labour and associated decline in agricultural labour (Kay, 2004; Loker, 1996). More alarmingly, this transformation has led to increasing economic inequality and social polarization (Kay, 2004; Keeling, 2004; Loker, 1996; Woods, 2007). Large sectors of rural societies find themselves excluded from the new rural economy unable to access the land, employment or capital necessary to take advantage of the new economic opportunities that neoliberal globalization provides.

The environmental impacts of neoliberal globalization in rural Latin America varies from place to place (Liverman & Vilas, 2006). In some locations neoliberal globalization has led to environmental recovery because processes such as the decline of traditional agriculture and rural-to-urban migration reduced the economic pressure on natural resources and promoted support for environmental protection (Aide & Grau, 2004; Baptista, 2008; Grau & Aide, 2008; Wright & Muller-Landau, 2006). However, in other locations processes such as the privatisation of property rights, agro-industrialization, population growth and poverty have intensified environmental degradation (Hecht, 2005; Keeling, 2004; Lopez, 2003). This reflects the multiple faces of globalization that are emphasized in the geographic literature described above.

1.3 The research project

1.3.1 Research approach and methodology

The research project presented in this dissertation used a two-tiered, qualitative case-study approach to examine how globalization impacts the sustainability of social-ecological systems within the context of contemporary Latin America (see Figure 1-1). It engaged with current directions in human-environment research in two important ways. It adopted a systematic perspective that drew on multiple theories and methodologies to examine multiple dimensions of the relationship between globalization and the sustainability of social-ecological systems. It also answered the call for problem-oriented research that can assist policy-makers and managers to address sustainability problems.

The use of a qualitative case-study approach facilitated this engagement. Qualitative case-study research is well-suited to the examination of complex human-environment systems. By focusing on particular cases of a phenomenon in its natural setting, qualitative case study is able to examine important interactions between components of a system, as well as between the system and its setting (Johnson & Onwuegbuzie, 2004; Stake, 1995, p. 37). Qualitative research is also able to reveal the "un-measurable" aspects of social processes that influence human-environment interactions, such as human values, cultures and perceptions (Bergsma, 2000).

Qualitative case studies also have a significant but underutilized contribution to make to policy-makers and managers working in the area of human-environment interactions. In particular, they can uncover important social processes that influence the performance of policies and programs in particular settings (Boyd, May, Chang, & Veiga, 2007; Smucker, Campbell, Olson, & Wangui, 2007). The need to conduct case study research to "unpack" social processes of human-environment interactions is formally recognized in agenda-setting documents of the international land-use/land-cover change (LUCC) research community (Lambin, et al., 1999, p. 37-8).

1.3.1.1 First tier (environmental policy-making in Costa Rica)

The first tier of the research project fulfilled Objective 1 and is reported in Chapter 2 (see Figure 1-1). It analysed the transfer of environmental policy between the international and Costa Rican political systems using policy transfer analysis. The frequency of policy transfer between different political systems has significantly increased in the last three decades under the influence of globalization (Dolowitz & Marsh, 2000; M. Evans, 2004). This part of the research was conducted through an analysis of emergent themes within existing literature. A large body of existing research has examined environmental policy-making in Costa Rica. However, the bulk of this literature focuses narrowly on the domestic policy-making arena. Analysis of emergent themes revealed the influence of policy transfer between the international and Costa Rican political systems that is implied in this literature but not systematically examined.

1.3.1.2 Second tier (land use in Costa Rica's dry North West)

The second tier of the research project fulfilled Objectives 2 and 3, which are reported in Chapters 3 and 4 respectively (see Figure 1-1). It was a qualitative study of forest recovery processes and changes in rural livelihoods in Costa Rica's dry North West. The dominant theory used to frame empirical studies of forest recovery processes in Latin America is Forest Transition Theory (FTT) (Mather & Needle, 1998; Rudel, 2005). This part of the research addressed some of the limitations of FTT by drawing on livelihoods approaches used in rural development and political ecology (Bebbington, 1999; Scoones, 2009). It was conducted through semi-structured interviews with landholders and community leaders. The fieldwork was conducted between April and July 2007. A novel methodology was used to streamline data collection and analysis in order to increase the timeliness and primary scale of analysis to match those of regional natural resource managers. It adopted a compare-and-contrast approach that used the results of an in-depth case study conducted in one community to target a streamlined process of data collection and analysis in four comparison communities. Interviews with management and industry representatives were used to cross-check and contextualize the results from the communities.

1.3.2 Case selection

The cases examined in each tier of the research project were selected both for their intrinsic value and for their wider relevance (see Figure 1-1).

1.3.2.1 First tier (environmental policy-making in Costa Rica)

Costa Rica's environmental policy-making was selected as a case for the first tier of the research project for two reasons. First, the results contribute to ongoing research by the Earth Observation Systems Laboratory (EOSL) at the University of Alberta aimed at supporting forest policy in Costa Rica. Since the 1990s, the EOSL in the Department of Earth and Atmospheric Sciences, in conjunction with the Costa Rican Institute of Technology (ITCR), has produced the official national forest cover maps for the Costa Rican government (Sánchez-Azofeifa, Calvo-Alvarado, Chong, Castillo, & Jiménez, 2006; U-Alberta & CCT, 2002). Researchers associated with the EOSL have also conducted numerous supporting studies of forest cover dynamics in various regions of Costa Rica (Arroyo-Mora, Sanchez-Azofeifa, Rivard, Calvo-Alvarado, & Janzen, 2005; Sánchez-Azofeifa, Rivard, Calvo-Alvarado, & Moorthy, 2002) and evaluated the conservation impact of forest conservation policies through spatial analysis (Kalacska, Sanchez-Azofeifa, Rivard, Calvo-Alvarado, & Quesada, 2008; Sánchez-Azofeifa, 2000; Sanchez-Azofeifa, Pfaff, Robalino, & Boomhower, 2007; Schelhas & Sánchez-Azofeifa, 2006). This dissertation adds to this research by examining the policy-making context of the forest cover dynamics that are observed in these spatial analyses.

The second reason for selecting Costa Rica's environmental policy-making as a case is that Costa Rica provides important learning opportunities for other developing countries, international development and conservation organizations, and researchers. Costa Rica has an important place as a pioneer in the development of forest conservation and sustainability policy in developing countries. Since the early 1970s, it has had considerable success with implementing these policies, beginning with its national system of protected areas (Boza, 1993; S. Evans, 1999) and continuing today with the development of its national system of payments for environmental services (PES) (Pagiola, 2008). Consequently, Costa Rica's experiences with policy-making and implementation are closely watched by external actors. This is evidenced in descriptions of Costa Rica as a "green laboratory" (Boza, Jukofsky, & Wille, 1995), a "prototype" for programs to reduce deforestation under the Clean Development Mechanism of the Kyoto Protocol (Subak, 2000), and a "leader" in forest conservation and management policies (Snider, Pattanayak, Sills, & Schuler, 2003). In short, Costa Rica has a high environmental profile, and its experiences influence forest conservation and sustainability policies far beyond its borders.

1.3.2.2 Second tier (land use in Costa Rica's dry North West)

Land use in Costa Rica's dry North West was also selected as a case for the second tier of the research project for two reasons. First, it is a rural area that has experienced rapid and intense change under the influence of globalization that had not been systematically examined prior to the research presented in this dissertation. These changes resemble those identified in other parts of Latin America, including a decline in traditional and subsistence agriculture, a rise in non-agricultural labour, and rural-to-urban migration (Calvo-Alvarado, McLennan, Sánchez-Azofeifa, & Garvin, 2008). These changes are also associated with environmental recovery. The forests in this area were all but eliminated by intense deforestation related to the expansion of pasture to supply cattle for the North American beef market (Arroyo-Mora, et al., 2005; Calvo-Alvarado, et al., 2008). However, since the 1980s this trend has reversed, and forest has recovered, albeit in an uneven and fragmented way (Arroyo-Mora, et al., 2005; Calvo-Alvarado, et al., 2008).

This case was also selected because it offers the opportunity to examine social drivers of forest recovery in one of the most threatened and understudied ecosystems in Latin America. The research project in this dissertation was conducted under the research program of Tropi-Dry, a collaborative research network with the goal of investigating the conservation status of tropical dry forest in the Americas (Sánchez-Azofeifa, et al., 2005; Sanchez-Azofeifa, et al., 2005). Costa Rica's dry North West contains one of the largest contiguous areas of tropical dry forest in Pacific Mesoamerica (Mata & Echeverría, 2004). The suitability of tropical dry ecosystems for human productive use means they have suffered wide deforestation and disturbance from human land-use activity (Murphy & Lugo, 1995; Quesada & Stoner, 2004). Furthermore, according to Miles et al. (2006), 97% of the remaining tropical dry forest in the world is still exposed to significant threats such as fire, population expansion, agricultural conversion and/or climate change. At the same time, however, far less is known about the conservation status of tropical dry forest because unlike other tropical ecosystems, it has not been the subject of a comprehensive research effort in the past (Miles, et al., 2006; Sanchez-Azofeifa, et al., 2005).

1.4 Structure of the dissertation

This dissertation is structured around the three objectives of the research project. It contains five chapters. In addition to the introductory and concluding chapters, the results of the research are presented in three independent but interrelated papers (Chapters 2, 3 and 4, see Figure 1-1). Each of the papers addresses one of the research objectives, and each is currently in the process of being submitted for publication.[1]

Chapter 1, the current introductory chapter, presents the interactions and linkages between three key concepts that underpin the subsequent chapters in the dissertation, *sustainability, social-ecological systems* and *globalization*.

Chapter 2 fulfils *Objective 1*: To analyse how environmental policy-making in Costa Rica was influenced by the transfer of policy ideas between the international and Costa Rican political systems. This chapter found that the successful policy transfer that supported innovative environmental policy-making in Costa Rica was enabled by three critical processes and conditions: the influence of transnational policy networks, incremental co-evolution of policies and supportive institutional arrangements, and the presence of structural conditions beyond the policy arena that supported environmental innovation. These findings challenge the current blueprint approach of international development agencies that promote the blanket use of market-based instruments for conservation in developing countries. The findings also warn against the tendency amongst some conservation actors to see Costa Rica's current PES system as a conservation model to be imitated elsewhere.

Chapter 3 fulfils *Objective 2*: To trial a novel methodology for conducting qualitative land-use research that can support natural resource managers to pursue sustainability while maintaining a high level of scientific credibility. It evaluated the strengths and limitations of a novel methodology developed within the research project: Oriented Qualitative Case Study. This methodology aims to better match the regional scale and shorter timeline of natural resource managers while maintaining high research quality. It found that the trialed methodology was able to strike balance between meeting manager' information needs and maintaining high research quality. This type of trade-off is suited to problem-oriented research that gives relatively greater priority to research salience (policy and management relevance) than basic research. This chapter also found that there is a relatively untapped opportunity for researchers to creatively use the flexibility of qualitative research to design studies to fit manager's information needs without decreasing overall research quality.

Chapter 4 fulfils *Objective 3*: To examine the specific processes of forest recovery and rural livelihood change in Costa Rica's dry North West, and the implications for sustainability and forest management. It examined the way that land use in Costa Rica's dry North West changed under the influence of processes associated with globalization, and how this led to net forest recovery. It found that there were multiple pathways to forest recovery related to landholders' uneven access to different types of livelihood resources. Such specific processes of forest recovery are overlooked by the generalized theory of FTT that focuses on large-scale processes only.

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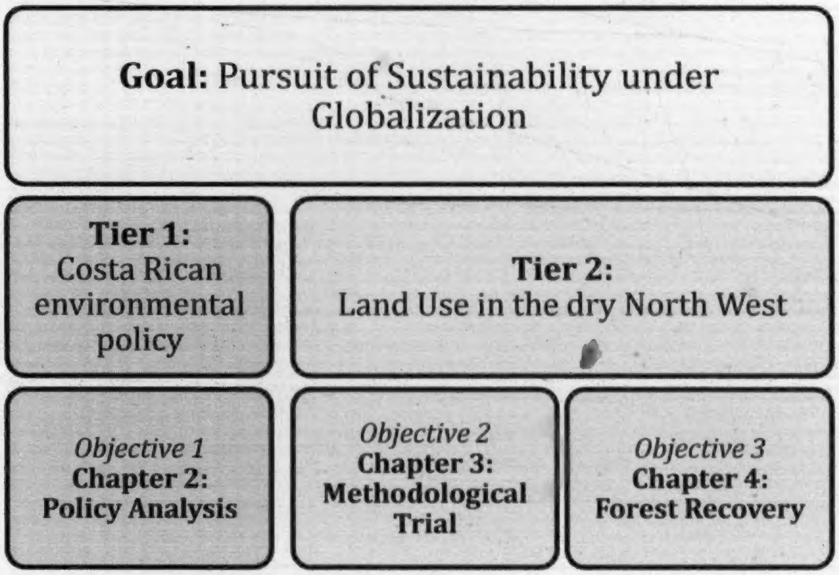
[1] Chapter 2 has been submitted to the editor of *Environment and Planning C*, Chapter 3 is in preparation for submission to *Society and Natural Resources*, and Chapter 4 is in preparation for submission to *Land Use Policy*. In addition, the background research for Chapters 3 and 4 contributed to a paper currently in-press with *Forest Ecology and Management*.

Chapter 5 is the concluding chapter. It identifies the relationships between the three independent papers, outlines the major contributions of the research, and discusses research limitations as well as future research directions.

1.5 Figures

Figure 1-1: Overview of the research project


Goal: Pursuit of Sustainability under Globalization
Tier 1: Costa Rican environmental policy
Tier 2: Land Use in the dry North West
Objective 1 Chapter 2: Policy Analysis
Objective 2 Chapter 3: Methodological Trial
Objective 3 Chapter 4: Forest Recovery

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2 Enabling environmental innovation through policy transfer: The Costa Rican example

> *If we can't succeed in Costa Rica, the darling of the international conservation community, are we all just whistling past the graveyard?*
>
> (Boza, Jufosky, & Wille, 1995, p. 684)[1]

2.1 Introduction

Since the early 1990s, there has been a global shift in approaches to national environmental policy. Governments have moved away from using traditional punitive regulatory approaches towards the adoption of more flexible instruments that *encourage* conservation rather than *enforce* it. In particular, market-based instruments such as carbon trading and payments for environmental services (PES) are becoming increasingly popular. Such market-based instruments use financial incentives to alter people's economic decisions in ways that benefit the environment (Grieg-Gran, Porras, & Wunder, 2005; Jordan, Wurzel, & Zito, 2003).

The growth of market-based instruments for conservation poses significant policy-making challenges for governments. Experience shows that market-based instruments require a range of conditions to be met in order to function well. For example secure land tenure systems, open and transparent environmental institutions, and advanced monitoring and evaluation systems, amongst other things, are necessary to ensure the integrity of market transactions and to encourage confidence in buyers and sellers (Landell-Mills & Porras, 2002; O'Connor, 2001; Russell & Powell, 1996; Serôa da Motta, Huber, & Ruitenbeek, 2001). Unfortunately, few national systems have all these necessary conditions already in place, particularly in the case of developing countries (Corbera, Kosoy, & Martinez Tuna, 2007; Greenspan Bell & Russell, 2002). The successful introduction of market-based instruments into national systems therefore requires the development of supportive regulatory and institutional frameworks. Building these frameworks is a complex and difficult process that has received surprisingly little attention, especially in developing countries (Landell-Mills & Porras, 2002; O'Connor, 2001; Steinberg, 2003).

This chapter looks at an example of policy making for a market-based instrument for conservation that was introduced in Costa Rica in 1997: the *Pago de Servicios Ambientales* (PSA) program. PSA compensates private landholders directly for the environmental services provided by their forests. It is an example of a wider category of conservation programs called payments for environmental services

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[1] Lead author, Mario Boza, is the former director of the Costa Rican National Parks Service and National Parks Foundation.

(PES).[2] Over the years Costa Rica has had considerable success in establishing a regulatory and institutional framework for PSA that is increasingly imitated elsewhere (Camacho Soto, Reyes Gatjens, Miranda Quirós, & Segura Bonilla, 2003; Subak, 2000).

The aim of the chapter is to show how the policy making in Costa Rica that culminated in PSA was enabled by the ongoing transfer of policy ideas between the international and Costa Rican systems, and how challenges to the process of transfer were overcome. Our rationale for doing this is not to advocate for nor oppose market-based instruments. Rather, it is to support the appropriate transfer of environmental policies of any kind between countries that can enable environmental innovation.

This work uses policy transfer analysis (PTA) as a theoretical lens to analyse environmental policy making in Costa Rica. PTA focuses attention on factors that influence how elements of policy created in one system can be successfully transferred to another system. This chapter is structured into three sections. The first section outlines the perspective of policy transfer analysis (PTA) and describes three key challenges to the transfer process. The second section explains how an ongoing process of transfer drove the policy making that culminated in Costa Rica's PSA. The third and final section examines conditions and dynamics in Costa Rica that overcame challenges to this transfer, and extracts some lessons about enabling environmental policy transfer between countries.

2.2 Background

2.2.1 The lens of policy transfer analysis

Policy transfer analysis (PTA) examines the "process by which knowledge about policies, administrative arrangements, institutions and ideas in one political system (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political system" (Dolowitz & Marsh, 2000, p. 5). The type of policy transfer varies depending on what elements are transferred. Transferred policy elements can include any one or more of policy goals, content, instruments, programs, institutions, ideologies, ideas, attitudes, or negative lessons (Dolowitz & Marsh, 2000). In addition, the way that a transferred policy is integrated into the recipient system can also vary, leading to differences in the degree of transfer (Dolowitz & Marsh, 2000; M. Evans, 2004c). For example, in some cases policy instruments are directly copied from one system to another, while in other cases the ideas that underlie a policy in one system are emulated, adapted and revised in the other system resulting in different policy solutions.

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[2] This chapter will use the acronym PSA to refer to the program implemented in Costa Rica, and the acronym PES to refer to the more general category of payment for environmental services programs.

While transfer can occur between or across any political levels (e.g. international, national, municipal), the frequency and importance of policy transfer into national systems is increasing worldwide (Dolowitz & Marsh, 2000). Changes associated with globalization, such as the rise of supra-national government and non-government institutions, and new communications technology have encouraged and enabled a greater exchange of ideas and knowledge between countries (Dolowitz & Marsh, 2000; M. Evans, 2004b).

When done well, policy transfer can benefit the recipient country by facilitating domestic policy learning, motivating innovation, and reducing the uncertainty that decision makers face when choosing policy solutions (Mossberger & Wolman, 2003; Stone, 2001). It is facilitated by policy networks, which are groups of actors that share common knowledge and ideas about policy problems and solutions (Stone, 2001; Kirsten Tews, 2005). Transnational policy networks have a particularly important role as they open up avenues for cross-national policy learning (Stone, 2001).

Not all transfer, however, is the direct result of policy learning (McDonnell & Elmore, 1987). Both structural and agent-based influences enable and constrain the policy transfer process in ways that can impact how new ideas and knowledge are accessed and adopted in the recipient country (M. Evans, 2004c). A central focus of policy transfer analysis (PTA), therefore, is on understanding how these influences impact the success of transfer.

There are five key components that interact to enable or constrain policy transfer: international structural conditions, national structural conditions in the recipient country, external transfer agents, internal transfer agents and policy content. Structural conditions, both international and national, restrict the type and degree of transfer that agents can engage in (Dolowitz & Marsh, 2000; M. Evans, 2004c; Mossberger & Wolman, 2003). Examples of international structural conditions include economic markets and multilateral agreements (Stone, 2001; Kerstin Tews, Busch, & Jorgens, 2003). National structural conditions within the recipient country that impact transfer are largely political or institutional (Dolowitz & Marsh, 2000). Dynamic political conditions such as political culture and changing power relationships amongst stakeholders shape what political opportunities exist in the country at a given time (Kingdon, 1984). Institutional conditions such as the requirements of pre-existing regulations and policies, and the administrative capacity of existing institutions set the rules and norms that define what agents may do (Dolowitz & Marsh, 2000).

The responses of external and internal transfer agents to structural conditions, and the interactions between them, ultimately determine the process and outcome of policy transfer (M. Evans, 2004c). External transfer agents represent interests outside of the recipient country. For example, supra-national governmental and non-government institutions, and foreign governments could all be defined as external transfer agents. Conversely, internal transfer agents represent interests within the recipient country. They can include domestic bureaucrats/civil servants, pressure groups and non-governmental institutions. Transfer agents can also cross the external/internal divide, particularly when transnational policy networks exist. For example, actors in regional offices of supra-national organizations may simultaneously represent the external interests of the organization as well as regional needs and priorities.

The final component that enables or constrains policy transfer is the content of the policy itself (de Jong, Waaub, & Kroesen, 2007). Each policy needs a different set of structural conditions to function effectively. Therefore, the content of the policy dictates how well it is suited to the specific conditions that exist in a particular country (de Jong, et al., 2007; Mossberger & Wolman, 2003; Kirsten Tews, 2005). For example, PES programs require secure land tenure systems so that landholders can demonstrate their right to supply environmental services associated with forested land. Consequently, PES programs are not suited to countries where land tenure systems are not well-established (Landell-Mills & Porras, 2002).

2.2.2 *Challenges to policy transfer*

For policy transfer to be successful, it must overcome three key challenges. These challenges are related to institutional fit, coercion, and innovative capacity.

2.2.2.1 *Institutional fit*

Institutional fit refers to the policy's appropriateness for the institutional framework within the relevant policy arena in the recipient country. Institutional fit is good when policy transfer requires a lower order of change from institutions (Stone, 2001). A low order of change involves only small adjustments to existing policy instruments and/or institutions. Conversely, institutional fit is considered bad when policy transfer requires a higher order of change from institutions. A high order of change involves significant institutional restructuring, and consequently it faces greater political and institutional resistance.

The order of change that a transferred policy requires from the relevant institutions in the recipient country is a function of the similarity between the institutional arrangements in the original and recipient countries, and the complexity of the policy (de Jong, et al., 2007). When institutional frameworks are similar, a lower order of change is required from the recipient policy arena because its structure already resembles the institutions that enabled the original policy, and therefore fit is good. On the other hand, when policies are more complex they need more specific institutional arrangements in order to function, which are not likely to exist in the same form in two different institutional settings. Therefore, when a transferred policy is more complex, it is likely to require a higher order of change from the recipient country's institutions. Institutional fit is therefore poorest when institutional arrangements between the original and recipient country are different and the transferred policy is highly complex. Conversely, institutional fit is best when institutional arrangements are similar and the transferred policy is simple. Consequently, institutional fit is considered to be a greater challenge for policy transfer from Western developed to developing countries because institutional arrangements are generally very different between them and policies originating in Western developed countries are also likely to be more complex (de Jong, et al., 2007; Serôa da Motta, et al., 2001).

2.2.2.2 Coercion

Coercion is the second key challenge to successful policy transfer. Policy transfer is coercive when external agents compel the recipient country to engage in transfer that it would not have otherwise engaged in freely (Dolowitz & Marsh, 2000). The degree of coercion varies along a continuum that ranges from voluntary to forced (Dolowitz & Marsh, 2000). In the current international system, coercion is most commonly "soft" or "negotiated" in nature, being applied through pressure rather than force (M. Evans, 2004c). Examples of soft coercion are the conditions that development agencies tie to loans made to national governments and the pressure that countries can experience from the international community to keep up with international "best practice" (Dolowitz & Marsh, 2000; Stone, 2001).

Soft coercion can have a positive or negative influence on policy making in the recipient country, depending on how it is exerted. An example of soft coercion with a positive influence is when pressure to keep up with international "best practice" encourages countries to improve national environmental standards or to cooperate to address global environmental problems. However, soft coercion can also seriously undermine the success of policy making when it compels transfer that is inappropriate for the conditions in the recipient country. This occurs when external transfer agents have poor knowledge of structural conditions within recipient countries and undervalue the importance of those conditions for enabling successful transfer (M. Evans, 2004a). In such cases external agents will tend to promote "one-size-fits-all" policy solutions that are not appropriate for the conditions in individual countries. When these external transfer agents are coercive, they can impose inappropriate transfer while also restricting the ability of internal transfer agents to tailor policies to better fit domestic conditions (Mossberger & Wolman, 2003). The negative influence of coercion is greatest when there is a significant imbalance of power between external and internal transfer agents. For example, developing countries are generally more dependent on external financial resources to put policies into practice (M. Evans, 2004b). This economic dependence can give external transfer agents considerable financial leverage to compel developing countries to engage in inappropriate policy transfer.

2.2.2.3 Innovative capacity

The third key challenge to policy transfer is the absence of supportive structural conditions. Broad, contextual conditions *outside* the policy arena are influential in shaping a country's capacity for taking on and implementing new ideas and programs *within* the policy arena (Jänicke, 2005). In the case of policy transfer, these structural conditions determine the capacity of the recipient country to make the changes required to adopt a transferred policy.

Jänicke (1992, 2005) identified three common sets of structural conditions shared by countries that he classified as environmental policy innovators. First, they had a high level of economic development. Not only did economic development provide financial resources and technology to put innovative policy into practice, it also contributed to higher education levels and higher awareness of environmental problems amongst the general population. This translated into higher levels of support for innovative environmental programs. Second, environmental innovators had an open political system with a political culture of dialogue and consensus. This increased communication and networking opportunities, supporting the formation of policy networks and opening channels for these networks to influence decision makers. Finally, innovators had developed a strong environmental knowledge base, with a robust scientific sector that supported both the identification of environmental problems and the development of innovative policy solutions. Together these three conditions support and enable innovation, thus increasing the likelihood of effective policy transfer.

In summary, policy transfer is an increasingly important source of innovation and learning at the national level that can, when successful, support the development of better policy solutions. By focusing on both structural and agent-based influences, policy transfer analysis (PTA) reveals important dynamics and conditions that enable or constrain successful transfer. Identifying how key challenges to successful environmental policy transfer are overcome is an important step towards enabling greater environmental innovation.

2.3 Policy-making for environmental innovation in Costa Rica

2.3.1 The national context

Costa Rica's success with environmental policy making needs to be understood against the backdrop of the country's history. Costa Rica is a comparatively small country on the Central American isthmus that is internationally renowned for its uncommonly peaceful history relative to the rest of the region (Bell, 1971; Booth, Wade, & Walker, 2006). Since a brief civil war in 1948, Costa Rica has elected successive governments through open democratic elections without violence or social upheaval (Ameringer, 1982; Lehoucq, 2005). This is in stark contrast to the turbulence that plagued the rest of the Central American region throughout the 1970s and 1980s (Booth, et al., 2006). Consequently, Costa Rica's governments have traditionally had a high level of legitimacy with the domestic population and also with the international community, although allegations of corruption and collusion have increasingly plagued its politicians in recent years (Lehoucq, 2005). Costa Rica has also provided a consistently high level of social services to its citizens, with a free, universal education system in place since the early 1800s, as well as a well-developed health care system and employment insurance (Booth, et al., 2006; Escalante, 2001).

Economically, Costa Rica has also fared better than other countries in the region (Booth, et al., 2006; Seligson & Muller, 1987). It experienced an economic "golden age" in the 1950s and 60s, riding on the strength of its coffee and banana industries, and later a growing beef industry. It survived a harsh economic downturn that hit the region in the 1980s with the aid of structural adjustment loans from the World Bank and the International Monetary Fund (IMF). Since then, it has recovered a robust economy, driven by an incredible growth in tourism and the emergence of a strong information technology industry (Colburn, 2006). At the end of 2007, following significant public protest, Costa Rica ratified a free trade agreement between the United States, the Central American countries and the Dominican Republic. The impact of this trade agreement on Costa Rica's future economy, society and environment has been widely debated within the country (Weinstein, 2006), however, its true impact will only be revealed over the coming years.

Costa Rica is a biodiversity hotspot that has earned itself an international "green" reputation. Although only 51,100 km^2 in size, Costa Rica contains an estimated 4-5 per cent of the world's animal and plant species in an incredibly diverse range of ecosystems (INBio, 2008). Between the 1930s and 1970s, however, Costa Rica had one of the highest per-capita deforestation rates in the world (Sánchez-Azofeifa, Harriss, & Skole, 2001). During this period an agricultural frontier rapidly expanded across the country, driven in part by population growth and government land colonization policies (Augelli, 1987). Since then, deforestation has slowed significantly (Kleinn, Corrales, & Morales, 2002), and some areas have even experienced considerable forest regrowth in recent years (Arroyo-Mora, Sanchez-Azofeifa, Rivard, Calvo-Alvarado, & Janzen, 2005). In the early 1970s, a national system of protected areas was created that today covers 25 per cent of the country (Sánchez-Azofeifa, Daily, Pfaff, & Busch, 2003).

More recently, Costa Rica's experiences with PSA have further bolstered its international green reputation. Under PSA, payments are made to landholders on a per-hectare/per-year basis in exchange for the provision of four specified environmental services: carbon sequestration, biodiversity protection, water source protection and scenic beauty (Calvo-Alvarado, 2000; Pagiola, 2008; Sanchez-Azofeifa, Pfaff, Robalino, & Boomhower, 2007). Landholders provide these services by agreeing to undertake one or more of a number of eligible activities, the most common being protection of natural forests and reforestation. While in receipt of PSA payments, landholders must adhere to a forest management plan approved by a certified forest engineer. The program is administered by the National Forestry Financing Fund (FONAFIFO), which is responsible for setting up contracts and distributing payments. Monitoring landholders' adherence to the management plans is the responsibility of the National System of Conservation Areas (SINAC), an administrative system of the Environment Ministry that oversees conservation management in the country (S. Evans, 1999). Funding for PSA payments comes predominantly from a national tax on fuel consumption; although additional funding has also come from private companies, particularly utilities, as well as international sources (Rojas & Aylward, 2003). Notably, the World Bank, in partnership with the Global Environmental Facility, has contributed significant funds since 2002 for the expansion of PSA: first through a five-year project called *Ecomercados* and most recently through a new project called Mainstreaming Market Based Instruments for Environmental Management (MMBIEM), which replaced *Ecomercados* in 2007 (Pagiola, 2008).

It is difficult to ascertain how successful PSA has been in practice, and recent studies of its performance have revealed mixed results (see for example Ibarra Gene, 2007; Sanchez-Azofeifa, et al., 2007; Sierra & Russman, 2006). The goals of PSA are two-fold: first, to deliver environmental services by curbing deforestation and protecting forests on private properties; and second, to secure external funding for forest conservation in Costa Rica. How far it has gone in fulfilling the first goal is currently under debate (Sanchez-Azofeifa, et al., 2007). Over 500,000 hectares have been submitted to PSA (FONAFIFO, 2006), but whether this land would have been deforested without PSA is difficult to determine, particularly in the absence of a good monitoring program (Pagiola, 2008). However, recent studies show that with increased targeting of payments to priority conservation areas, PSA may be able to secure a higher conservation contribution and to increase the efficiency of its payment system (Wunder, 2007; Wünscher, Engel, & Wunder, 2008). Costa Rica has also managed to partially fulfil its second goal of acquiring external funding, for example through the World Bank sponsored projects. However, this funding has not been sufficient to cover the demand for new contracts from landholders (Pagiola, 2008). Finding ways to increase its demonstrable conservation impact and to secure new sources of external funds for payments are the two greatest challenges to the ongoing success of the PSA program.

2.3.2 Policy transfer and the co-evolution of policy ideas

The process of environmental policy making that culminated in the PSA program in Costa Rica took almost three decades. The engine that drove this process was the ongoing transfer of policy ideas between Costa Rica and the international system via transnational policy networks (see Figure 2-1), which fused international policy ideas with those already circulating within Costa Rica and led to new policies and programs. At the same time, this process generated policy-making experience that built up institutional and human capacity for environmental conservation. Consequently, the environmental regulations and institutions that support PSA today are a cumulative outcome of policy development generated across a number of decades.

Policy ideas in the two systems coevolved through four key phases (see Figure 2-1). In each phase, the direction of policy and program implementation in Costa Rica was guided by a different core policy idea. It should be noted that the four phases were not distinct, clearly defined periods. Rather, new policy ideas emerged, overlapped and evolved through time.

The first phase of policy evolution began in the early 1970s following rising awareness of the environmental crisis in Costa Rica from escalating deforestation (S. Evans, 1999). At this time, the idea of conserving forest through protectionism – excluding people from using natural resources in dedicated protected areas -

was prevalent in the international arena (Campbell, 2002). Foreign scientists first introduced this idea into the country when they came to Costa Rica to study its biodiversity (Wallace, 1992). Along with key actors in the Agriculture Ministry, they had become aware of the extent of the deforestation threat and campaigned through personal networks, the media, and formal political channels for the creation of protected areas that could salvage the last remnants of endangered forests (S. Evans, 1999). In 1969, a seminal new Forest Law was passed that created the country's first National Parks Department and a National Forest Service, both of which were initially housed within the Agriculture Ministry. Over the next decade the new environmental policies were consolidated. During this period the number of park units increased, the status and independence of the National Parks Department grew, research institutions such as the Tropical Science Centre and the Tropical Agricultural Research and Higher Education Centre (CATIE) trained the first national park managers, and international funding for parks was pursued (Boza, 1993). These developments made this period an important one for strengthening ties between Costa Rican and international environmental actors.

The second phase of policy evolution focused on sustainable development (see Figure 2-1). It began in the mid 1980s when new international ideas again merged with national developments to drive a fundamental philosophical shift in Costa Rican conservation (Camacho Soto, et al., 2003; De Camino, Segura Bonilla, Guillermo Arias, & Pérez, 2000). In the international arena, the release of the World Commission on Environment and Development report in 1985, commonly known as the Brundtland Report, brought the concept of sustainable development to international attention (Mebratu, 1998). Through the transnational networks established in the previous stage, Costa Rican decision makers were familiar with the new ideas that focused on integrating environmental conservation with economic and social development. Meanwhile, within Costa Rica the creation of national parks had produced social conflict amongst local populations in some areas. These populations were economically disadvantaged by their exclusion from using the natural resources in the parks (Campbell, 2002; S. Evans, 1999; Hopkins, 1995). The most extreme example of this was Corcovado National Park, which was twice invaded by large numbers of gold panners seeking work after the collapse of the banana industry in the country's south east (Cuello, Brandon, & Margoluis, 1998; Wallace, 1992). These invasions culminated in intense social conflict that brought the national parks system to the brink of collapse in the 1980s (Wallace, 1992).

The shift to sustainable development was a pivotal one in the evolution of policy for PSA because it turned government attention away from protected areas and focused it more firmly on the conservation and management of forests on private land. This shift was reflected in the development of conservation incentive programs (Barrantes, 2000). The nature of these incentive programs changed over time, but they all used a system of tax credits to compensate landholders for costs incurred by reforestation, forest conservation and forest management activities. The new focus on sustainable development was written into Costa Rica's National

Strategy for Sustainable Development, called ECODES, which was published in 1990 (Calvo-Alvarado, 1990). Although later abandoned, ECODES foreshadowed many of the key developments in environmental policy in the following decade. The idea of sustainable development was further entrenched within Costa Rica through the country's participation in the 1992 United Nations Conference on the Environment and Development in Rio de Janiero, Brazil (the Rio Earth Summit). Costa Rica is a signatory of all the major multilateral conservation agreements that flowed out of this event, and the Summit renewed national debates about sustainable development in Costa Rica (Camacho Soto, et al., 2003; MINAE, 2002).

The emergence of the concept of environmental services in the early 1990s characterized the third phase (see Figure 2-1). It did not replace the idea of sustainable development. Rather, it shifted debates over the best way to achieve sustainable development in practice. The concept of environmental services changed the justification for conservation incentives from the value of timber to the value of environmental services (Pagiola, 2006), and from subsidizing an industry to paying for a service (Brockett & Gottfried, 2002). This subtle but important distinction gave the new idea weight with international development agencies, and financial pressure from the IMF and the World Bank is considered one of the primary reasons for the shift to PSA in Costa Rica (Brockett & Gottfried, 2002; De Camino, et al., 2000). In line with the neoliberal ideologies that were emerging in the 1990s, the IMF and the World Bank required recipients of structural adjustment loans to remove government subsidies to industry (De Camino, et al., 2000; Rojas & Aylward, 2003). At that time, Costa Rica had received a number of structural adjustment loans from the IMF and it was negotiating its third loan with the World Bank (De Camino, et al., 2000). As PSA was not considered a subsidy, it was the only type of conservation incentive allowed under the loan conditions (Brockett & Gottfried, 2002; Camacho Soto, et al., 2003).

The concept of environmental services was not just an imposition from the IMF and World Bank; it also had supporters within Costa Rica. According to Rojas and Aylward (2003) "by the mid-1990s there was in Costa Rica an increasingly widespread appreciation of the linkages between environmental services and the economy, particularly among a growing clique of environmental policy-makers and entrepreneurs" (Pagiola, 2006). Again, this support grew out of a fusion of international and domestic ideas. Decision makers in Costa Rica were familiar with international "best practice" in the use of economic tools for environmental protection (Rojas & Aylward, 2003). They were also influenced by forest valuation studies conducted by the Tropical Science Centre within the country (Brockett & Gottfried, 2002; De Camino, et al., 2000).

The fourth phase of policy evolution centred on the design and implementation of PSA. In this phase, the idea of environmental services was transformed into a useable instrument. This phase overlapped with the previous one, taking place throughout the 1990s (see Figure 2-1). The policy making process at this time was highly fragmented and complex and the focus was on restructuring the forestry industry rather than pursuing conservation programs (see for example Brockett & Gottfried, 2002; De Camino, et al., 2000; Silva, et al., 2002). Four different advocacy coalition networks formed with competing ideas over the future of forestry (Silva, et al., 2002).[3] They advocated for either market-friendly, conservationist, technocratic or grassroots interests (see also Campbell, 2002; Nygren, 1998; Silva, et al., 2002). Eventually, an alliance developed between market-friendly and conservationist networks, and a new Forest Law was passed in 1996 that emphasized these interests. Their position was further bolstered by a Ministerial decree that created SINAC and effectively ended the more technocratic National Forestry Service (Silva, et al., 2002). This outcome was important for the development of PSA, as alternative versions of the forest law were also proposed that did not include provisions for PSA (Silva, et al., 2002). Therefore, the rise of the market-friendly/conservationist alliance allowed for the creation of the PSA instrument, despite the fact that the key issues being fought over at the time centred on the future of the forestry industry rather than on conservation per se.

The involvement of international actors was an important dynamic in policy making leading to the development of the 1996 Forest Law. The fragmented nature of the domestic policy networks allowed multiple international actors to press their own agendas (Brockett & Gottfried, 2002; Silva, 2003; Silva, et al., 2002). The most influential international actors proved to be USAID.[4] It aligned with the Environment Ministry and the timber industry to push for a combined market-friendly and conservationist approach to forestry. It funded a number of influential scientific studies to advance its preferred policy solutions and it also created and financed a National Forestry Council that campaigned heavily for a market-friendly forest law on the behalf of the timber industry.

Importantly, the flow of policy ideas between the international and Costa Rican systems has changed directions. In the first three phases, the flow of policy ideas was strongest from the international system to Costa Rica (represented by the width of block arrows in Figure 2-1). However in the fourth phase of designing and implementing PSA, the ideas generated from Costa Rica's experiences have significantly influenced ideas in the international system (Pagiola, 2008; Rojas & Aylward, 2003; Subak, 2000). As a result, Costa Rica has shifted from being a net recipient of transferred environmental policy ideas to a net source of ideas. Today, Costa Rica's approach to the implementation of PES programs is increasingly imitated by other countries and organizations that wish to replicate its successes (Pagiola, 2008). PSA is also pointed to as an example of how projects to reduce deforestation could work under the Clean Development Mechanism of the Kyoto Protocol (Subak, 2000).

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[3] Advocacy coalition networks are groups of actors that are bound by a shared set of core ideas and interests, and which advocate for particular policy solutions (see Jenkins-Smith & Sabatier, 1993).

[4] For a more complete description of the roles of the various international actors that were involved in Costa Rican forest policy making at this time (see Silva, et al., 2002).

2.4 Discussion

2.4.1 Enabling successful environmental policy transfer

Policy transfer drove the process of environmental policy making that culminated in PSA in Costa Rica. Enabling policy transfer was therefore critical for supporting environmental innovation in the country. An important process that enabled successful transfer was overcoming the challenges of institutional fit, coercion, and innovative capacity.

2.4.1.1 Building institutional fit

The institutional fit of PSA was facilitated by a process of capacity building that established an institutional framework to support the program *before* it was introduced (Camacho Soto, et al., 2003). Importantly, Costa Rica's experience shows that institutional capacity building occurs over long periods of time through experience with prior environmental policy. This finding corroborates a review conducted of eleven cases of market-based instruments implemented in Latin American countries, not including Costa Rica (Serôa da Motta, et al., 2001). The review concluded that environmental policy making is most successful when institutions and policies evolve together incrementally. Slow co-evolution from simple to more complex policy systems supports a good match between policies and institutions that is sustainable over time. Before PSA was implemented, Costa Rica's environmental institutions had already undergone progressive restructuring over time, which raised the status of environmental agencies and increased their independence from other government agencies and ministries (Camacho Soto, et al., 2003; S. Evans, 1999). Consequently, only minor institutional changes were required to be made to implement PSA, most notably removing administrative authority of the fund for PSA payments from the central treasury to FONAFIFO.

Institutional capacity also includes human capacity to administer policies (Serôa da Motta, et al., 2001). In Costa Rica, human capacity for administering PSA was also built up through previous experiences with environmental policy making. At the time that comprehensive environmental policy making first began in the 1970s, Costa Rican environmental actors had minimal environmental policy experience, little scientific or technical training, and little influence within Costa Rica's political system (Boza, 1993). In the 1990s, however, the picture was very different. By this time, environmental actors had become very influential in national government, and were highly trained and experienced in managing environmental policies. In particular, key actors, with skills in both domestic and international systems were crucial for bringing together all the components needed for good policy making (Steinberg, 2003). They fulfilled the important role of "policy entrepreneurs", using their connections to transnational policy networks to bring new ideas to Costa Rica and then advocate for their implementation within the domestic system (Dolowitz & Marsh, 1996; Mintrom, 1997). Together, this environmental policy expertise coupled with an enabling set of institutions built a good institutional fit for PES in Costa Rica.

2.4.1.2 Attenuating coercion

It is difficult to gauge the precise extent of coercion exerted by external transfer agents on Costa Rican environmental policy. However, it is clear that at least a soft form of coercive pressure was exerted on Costa Rican decision makers, especially in the third and fourth stages of the process. In the third stage, the IMF and the World Bank required that the Costa Rican government replace subsidy programs with payments for environmental services in order to secure future development loans. In the fourth stage, regional representatives of development agencies, in particular USAID, used the fragmented nature of domestic policy networks to advance their own agendas in the conflict over Forest Law 7575.

As is the case in most developing countries, Costa Rican conservation efforts have depended on substantial external funding (Steinberg, 2003). This gave external actors considerable economic leverage in its environmental policy making, increasing the vulnerability of Costa Rica to coercion. However, coercion was attenuated in two ways: the alignment of international and Costa Rican policy ideas and the strategic capacity of Costa Rican environmental actors. Some PTA authors suggest that the influence on policy ideas that is exerted through transnational policy networks is also a form of soft coercion (Stone, 2001). In the case of Costa Rica, however, the synthesis of international and Costa Rican ideas could more aptly be described as a process of fusion rather than coercion. For example, the message from the IMF and the World Bank to replace subsidies for conservation with payments for environmental services was not imposed, rather it fell on supportive ears, and was therefore quickly adopted and championed by influential internal transfer agents (Silva, 2003).

The strategic capacity of Costa Rican environmental actors also attenuated the coercive pressure from regional offices of development agencies. Over the past three decades, Costa Rican environmental actors have become very adept at negotiating and capitalizing on the opportunities created by the involvement of external actors in the country's environmental policy making (Hopkins, 1995). For example, they used the international support for market-based conservation to secure greater control of partnership projects and new funding. When the idea of carbon trading first emerged on the international stage, Costa Rican environmental actors acted quickly to secure a competitive advantage for Costa Rica in international programs by setting up an institutional framework for carbon trading. In particular, they created a National Office of Activities Implemented Jointly, or OCIC, which is responsible for managing joint projects under the United National Framework Convention on Climate Change (Subak, 2000). By doing this, they positioned Costa Rica as a service provider rather than a host country for donor-led conservation projects. This strategic move gave Costa Rica greater control over the direction of key internationally funded conservation projects located within its territory (Subak, 2000).

2.4.1.3 Structural conditions for innovation

Structural conditions in Costa Rica supported innovative environmental policy making from its earliest stages. The most important of these conditions were the development of a semi-industrialised economy, a stable democratic political system, and a strong academic-scientific sector that was linked to decision makers through policy networks.

First, the development of a semi-industrialized economy took pressure off land as an economic resource and provided an economic incentive for conservation. Costa Rica's economy has changed over time from an agrarian to a semi-industrialized economy (Sánchez-Azofeifa, 2000). This shift mirrored similar economic developments occurring right across the Latin American region (Booth, et al., 2006). Under an agrarian economy, government policies in Costa Rica encouraged the conversion of forest to cropland and pasture exacerbating deforestation (Augelli, 1987). In the semi-industrialized economy the growth of tourism, in particular ecotourism, gave an important economic incentive to conservation (S. Evans, 1999). Furthermore, the growth of the manufacturing and services sectors decreased the economic importance of land and pulled people away from agricultural business and employment (Colburn, 2006).

Costa Rica's stable democratic political system is the second structural condition that supported innovative environmental policy. The existence of a stable and peaceful political system in the country encouraged international confidence in its environmental institutions and encouraged international funding agencies to invest in conservation in the country (Boza, Jukofsky, & Wille, 1995). This international support helped to sustain transnational policy networks and facilitate the transfer of policy ideas between Costa Rica and the international system. It also gave Costa Rica remarkable access to important international financial support for conservation programs (Hopkins, 1995; Steinberg, 2003). At the same time, this stable democratic tradition encouraged consensual resolution of environmental conflicts within the country and meant that major social conflict was either avoided or overcome (Boza, et al., 1995; Hopkins, 1995).

Finally, a strong academic-scientific sector also supported innovative environmental policy. This sector has existed in Costa Rica since the 1960s and has provided intellectual leadership for environmental policy making since that time by developing scientific and applied research, and by preparing qualified professional in forestry, biology, and environmental management and policy (Eakin, 1999; S. Evans, 1999). It is composed of both Costa Rican and foreign scientists linked through collaborative research institutions. Costa Rica's scientific community developed into a strong "epistemic community" (Haas, 1992).[5] Importantly, this epistemic community was also linked to decision makers through wider policy networks. Through these links the scientific sector trained the majority of the country's environmental managers, raised awareness of environmental problems, and provided important direction on appropriate solutions (Eakin, 1999; S. Evans, 1999; Zbinden & Lee, 2005).

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[5] Epistemic communities are networks of experts with policy-relevant knowledge (Haas, 1992). They support policy learning by providing decision makers with information that reduces the level of uncertainty associated with different policy solutions.

2.5 Conclusions

The rationale given for undertaking the present study was to support the appropriate transfer of environmental policy between countries that can enable environmental innovation. Two observations from the current literature reveal this to be an important area of research. First, international development agencies are increasingly criticised for promoting the introduction of market-based instruments for conservation in developing countries without adequately considering whether they are appropriate for conditions within the individual countries (Greenspan Bell & Russell, 2002; O'Connor, 2001). If this leads to the inappropriate transfer of market-based instruments, it may undermine the success of conservation efforts in the recipient countries. Second, Costa Rica's PSA program is increasingly seen as a conservation model to be imitated elsewhere (Pagiola, 2008; Sanchez-Azofeifa, et al., 2007). This presents a danger that Costa Rica's PSA may be used as a model to further facilitate the inappropriate transfer of market-based instruments if it is imitated without adequate consideration of the conditions required for it to function well.

Together, these observations indicate that more attention needs be given to how the successful transfer of environmental policies from one country to another is enabled. The Costa Rican example shows how successful policy transfer enables environmental innovation, and how challenges to transfer may be overcome. It reveals three critical components for enabling the transfer of environmental policy to any country.

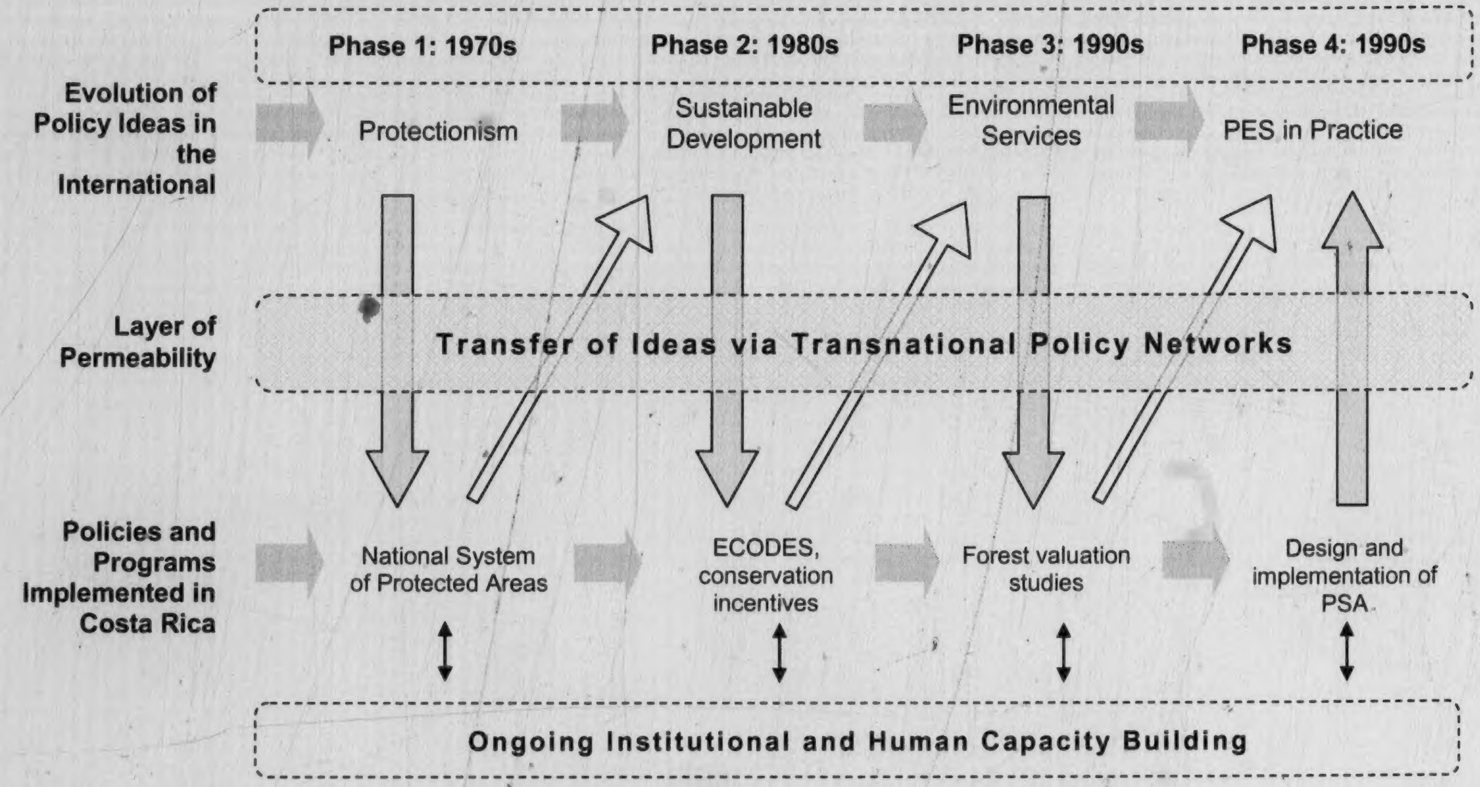
First, transnational policy networks have a central role in policy transfer, and therefore fostering the development of these networks can promote more effective policy transfer. Transnational networks also contribute to attenuating the negative impacts of external coercive pressures by aligning domestic and international policy ideas, which is important for successful transfer.

Second, policy making that enables environmental innovation is an incremental process. A good fit between appropriate policies and supportive institutions that is sustainable over time requires the co-evolution of policies and institutions together through progressive policy making (Serôa da Motta, et al., 2001). One criticism laid against development agencies that promote the use of market-based instruments in developing countries today is that they push for the implementation of complex policies too quickly to enable this co-evolution of institutions to occur (Greenspan Bell & Russell, 2002).

Third, certain structural conditions outside the policy arena are crucial for supporting environmental innovation. The introduction of any new policy requires changes to be made to both the policy itself and the existing institutional arrangements in order to increase institutional fit. It is broader structural conditions that determine a country's capacity to make the necessary changes. Costa Rica is uncommon amongst developing countries in having strong structural conditions to support innovation. Replicating Costa Rica's successes with environmental policy making in other countries will require greater consideration of (a) how structural conditions outside the policy arena support environmental innovation, and (b) how these conditions can be developed in countries where they do not currently exist.

2.6 Figures

Figure 2-1: The policy-making process that culminated in *Pago de Servicios Ambientales* (PSA) in Costa Rica


Phase 1: 1970s
Phase 2: 1980s
Phase 3: 1990s
Phase 4: 1990s
Evolution of Policy Ideas in the International
Protectionism
Sustainable Development
Environmental Services
PES in Practice
Layer of Permeability
Transfer of Ideas via Transnational Policy Networks
Policies and Programs Implemented in Costa Rica
National System of Protected Areas
ECODES, conservation incentives
Forest valuation studies
Design and implementation of PSA
Ongoing Institutional and Human Capacity Building

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3 Fitting qualitative research to the needs of natural resource managers: A methodological trial

A little knowledge that acts is worth infinitely more than much knowledge that is idle.
- Kahlil Gibran

3.1 Introduction

Natural resource managers need the support of scientific research now more than ever. Compared to the past, natural resource management is increasingly challenging. Human dominance of the globe has increased the interconnections within and between social and ecological systems around the world, amplifying the scope, pace and complexity of human-environment interactions (Gallopin, Funtowicz, O'Connor, & Ravetz, 2001; Lubchenco, 1998). At the same time, the democratization of decision-making has opened management to a wider range of actors and perspectives (Gallopin, et al., 2001; Nygren, 2005). This has led to calls for new and fundamentally different management approaches (Berkes, 2004; Holling, Berkes, & Folke, 1998; Kinzig, 2001; Salafsky, Margoluis, Redford, & Robinson, 2002). However, complex problems require complex solutions (Ostrom, 2007), and new approaches such as incentive-based conservation programs (Spiteri & Nepalz, 2006) and adaptive management (B. L. Johnson, 1999; Niemela, et al., 2005) are more difficult to implement than managing for maximum sustainable yields and "command-and-control" approaches to resource protection that were more prevalent in the past (K. Brown, 2002; Holling, et al., 1998).

In this context, scientists are increasingly expected to engage with natural resource managers and to support them to make sense of, and respond to, complexity and uncertainty (Mills & Clark, 2001; Morghan, Sheley, & Svejcar, 2006; Szaro, et al., 1998). However the complexity of social-ecological systems also challenges existing scientific methods. Interlinked social-ecological systems defy explanation using the reductionist methods of mainstream science (Bell, 2005; Holling, et al., 1998). As a result, both scientists and society also call for new ways of doing science that are better-able to confront the problems of today's more interconnected and complex world (Cash, et al., 2003; Clark, 2007; Kates, et al., 2001; Lee, 1993; Lubchenco, 1998; McMichael, Butler, & Folke, 2003).

Qualitative research has a valuable contribution to make to natural resource management in today's context. It reveals the "un-measureable" aspects of social processes, such as human values, culture and perceptions, that influence natural resource use and decision-making much more than has been recognized in the past (Bergsma, 2000). Qualitative research has generally been underutilized in natural resource management. This is partly because managers are commonly trained in, or more familiar with, quantitative research methods, and may not accept qualitative research (Bryant & Wilson, 1998; Szaro, et al., 1998). It is also due to the complexity of social-ecological systems and the in-depth nature of qualitative research.

One way to overcome such challenges is to develop new methodologies that are designed with the needs of both research and management in mind. However, changing the way research is done without threatening its credibility is a formidable task (Booth, 1995; K. N. Johnson, Duncan, & Spies, 2007; Mills & Clark, 2001; Ritchie & Spencer, 2002; Szaro & Peterson, 2004). In order to ensure that new methodologies have an acceptably high level of scientific credibility, they must be trialed in processes that are critical, self-reflective and transparent (Booth, 1995; Campbell, 2001; Kapoor, 2002).

This chapter reports on one such trial of a novel methodology for conducting qualitative research in natural resource management: Oriented Qualitative Case Study. The goal of the trial was to evaluate the ability of the methodology to meet managers' information needs while also maintaining a high level of scientific credibility. In particular, it aimed to better match the research process to the scales and timelines of regional managers. The trial took place within a broader study. The substantive goal of the study was to understand how social factors at different scales interact to drive land-use/land-cover change (LUCC) in Costa Rica's dry North West. The most significant historical trend in LUCC in Costa Rica has been one of prolonged and intense deforestation (Kleinn, Corrales, & Morales, 2002; Sánchez-Azofeifa, 2000). Although forest has recovered in some parts of the country in more recent years (Arroyo-Mora, Sanchez-Azofeifa, Rivard, Calvo-Alvarado, & Janzen, 2005; Kull, Ibrahim, & Meredith, 2007), managing LUCC to protect important forest-based ecosystem services remains an important function of natural resource managers in Costa Rica today (MINAE, 2001).

The remainder of this chapter is divided into three sections. The first section outlines the contributions of qualitative research to natural resource management and the methodological challenges for fitting qualitative research to managers' needs. The second section presents the methodological trial, describing Oriented Qualitative Case Study and reporting on as assessment of its strengths and limitations. The third and final section discusses trade-offs and opportunities in the design of management-relevant research that are highlighted by the present study.

3.2 Background

3.2.1 Contributions of qualitative research

Qualitative research is essentially any research that does not use numerical measurement. The most common methods used in qualitative social research include one-on-one interviews, focus groups, and participant observation (Ritchie & Spencer, 2002). Qualitative and quantitative methods each have their own strengths and weaknesses (Bryman, 1999; R. B. Johnson & Onwuegbuzie, 2004; Salomon, 1991). Although it is all too easy to oversimplify differences between them (Hammersley, 1999), there are still discernible distinctions between their designs and applications. A typical qualitative study focuses on the detailed investigation of one or more particular cases of a phenomenon in its natural setting (R. B. Johnson & Onwuegbuzie, 2004; Willis, 2007, p.188-90), while a typical quantitative study commonly adopts a larger-scale focus in a more controlled setting (Bryman, 1999). In general, qualitative research puts greater emphasis on depth over breadth of knowledge, flexibility over structure in the research process, whole cases over isolated parts, and subjective meaning and understanding over general explanatory theories (R. B. Johnson & Onwuegbuzie, 2004; Maxwell, 2005; Philips, 1998; Stake, 2005). Researchers can also combine the strengths of both sets of methods in mixed-method research (R. B. Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998).

Qualitative research is particularly suited to the study of complex systems (R. B. Johnson & Onwuegbuzie, 2004; Stake, 1995, p. 37), and it therefore has much to contribute to natural resource management today. For example, qualitative research has been used to identify land users' subjective perspectives of natural resource management issues (Pfeffer, Schelhas, & Day, 2001; Spilsbury & Nasi, 2006), which influence land-use decision-making, user acceptance of management actions and participation in incentive programs (Boyd, May, Chang, & Veiga, 2007; Smucker, Campbell, Olson, & Wangui, 2007). Because it can generate new, unanticipated data, qualitative research can also shed new light on old problems (Rubin & Rubin, 2005, p.3) that may reveal innovative solutions and management strategies (Morghan, et al., 2006). It can also reveal how local social processes respond to large-scale drivers of social-ecological change (Smucker, et al., 2007), discover valuable local ecological knowledge (Robbins, 2003; Vogt, et al., 2006), and evaluate the social processes behind decision-making and program implementation, as well as the social impacts of implemented programs (Boyd, et al., 2007).

3.2.2 Challenges for qualitative research

Unfortunately, the potential contribution of qualitative research to natural resource management faces significant challenges. The first set of challenges applies to all fields of management and research. It involves the difficult negotiation of the "interface" or "boundary" between science and practice that both protects the legitimacy of science but also creates barriers to engagement between scientists and managers (Cash, et al., 2002; Funtowicz & Ravetz, 1993; Garvin & Lee, 2003; Guston, 2001; Jasanoff, 1987; Lélé & Norgaard, 1996; van den Hove, 2007). Such engagement challenges already receive considerable attention within the field of natural resource management (Carolan, 2006; K. N. Johnson, et al., 2007; Knight, et al., 2008; Morghan, et al., 2006; Slob, Rijnveld, Chapman, & Strosser, 2007; Spilsbury & Nasi, 2006).

The focus of this chapter is on a second set of challenges that looms particularly large for qualitative research and natural resource management. This category is methodological, concerning how to produce the right information for managers at the right time. In general, managers need information faster than standard scientific methods can produce it (Booth, 1995; Mills & Clark, 2001; Slob, et al., 2007). This creates a gap between the time it takes to do good quality research, and managers' shorter timelines. For qualitative research and natural resource management, this gap is even wider. Change in social-ecological systems can occur very quickly (Folke, Hahn, Olsson, & Norberg, 2005), increasing managers' needs for timely information. However, qualitative research is inherently in-depth and time-consuming, making it difficult to produce qualitative findings in a timely fashion.

Meanwhile, social-ecological systems are also multi-scaled, creating additional difficulties for linking management and research. In particular, they have scale dependent properties, which are properties that appear at one scale but not others (Cundill, Fabricius, & Marti, 2005; Veldkamp, et al., 2001; Wilbanks & Kates, 1999). Because of this, effective management of social-ecological systems requires multi-scaled institutional arrangements (K. Brown, 2003; Cumming, Cumming, & Redman, 2006). Similarly, scientific studies of social-ecological systems need to use multiple scales of analysis (Ostrom, Janssen, & Anderies, 2007), as they cannot be up- or down-scaled without overlooking the influence of emergent properties that appear at scales other than the scale of analysis. As many important ecological processes occur at regional scales (e.g. at the level of a watershed or ecological zone), regional-scaled institutions have important roles in natural resource management (Allan & Curtis, 2005; Gibson, Ostrom, & Ahn, 2000; K. N. Johnson, et al., 2007; Szaro, Boyce Jr, & Puchlerz, 2005). However, empirical qualitative research tends to be restricted to smaller-scale studies (Gillham, 2000, p.12; Philips, 1998; Ritchie & Spencer, 2002, p.309). This creates a gap between the scales of management and the scales of research, which combined with the gap between their timelines, further restricts the contribution of qualitative research to natural resource management.

To meet managers' information needs, qualitative researchers need to make compromises to the way they do research to overcome these methodological challenges (Booth, 1995; Funtowicz & Ravetz, 1993; Mills & Clark, 2001; Ritchie & Spencer, 2002). However, making any changes to the way research is done without negatively impacting its quality is a difficult task. The credibility of all scientific research, whether applied or basic, depends largely on its adherence to accepted standards of theory, design and methodology that have been tested and shown to produce trustworthy findings. As qualitative research is flexible and exploratory, standard methods employ quality measures in all stages of the research process (Baxter & Eyles, 1997; Fossey, Harvey, McDermott, & Davidson, 2002; Maxwell, 2005, p.105-116). This contrasts with quantitative research which employs quality measures mostly in the design and validation stages (Maxwell, 2005, p. 105-116). Altering any stage of qualitative research therefore poses a threat to overall credibility.

The difficulty of altering standard qualitative methods to increase management – relevance is highlighted by experiences with Rapid Rural Appraisal (RRA). RRA, also known as participatory rural appraisal (PRA), is a collection of methods specifically aimed at gathering qualitative data in the field in a timely manner (Carruthers & Chambers, 1981; Chambers, 1994a; Crawford, 1997; Kumar, 1993).[7] RRA is used increasingly to research natural resource management issues (see for example Bolland, Drew, & Vergara-Tenorio, 2006; M. E. Brown, 2006; Vogt, et al., 2006). In general RRA collects less data over a shorter time period and uses less detailed analysis methods compared to standard qualitative methods. To protect against threats to quality it primarily relies on the triangulation of data sources, data collection methods, and researchers (Chambers, 1994b).

RRA has been heavily criticised for compromising its credibility in its efforts to produce more timely findings for managers (Campbell, 2001, 2002; Goebel, 1998; Kapoor, 2002; Leurs, 2003). Common criticisms include that RRA practitioners do not gather enough data or spend enough time in the field, they do not seek out exceptions or vulnerable populations, and they do not consider the limitations of each data collection and analysis method they use (Campbell, 2001, 2002; Goebel, 1998; Kapoor, 2002; Leurs, 2003). However, in spite of such charges, critics of RRA also recognise its value both as an evaluation process and as a fertile ground for expanding qualitative methods in innovative ways (Campbell, 2002; Goebel, 1998). Thus the experiences of RRA show that while streamlining qualitative research can be dangerous, it can also be very rewarding.

The remainder of this chapter reports on the trial of Oriented Qualitative Case Study, which is a qualitative methodology that explicitly seeks to confront the methodological challenges of scale and timeliness while avoiding the loss of credibility that has occurred in some RRA studies. The underlying rationale for the trial is to more fully realise the valuable contribution of qualitative research to natural resource management.

3.3 The methodological trial

3.3.1 Study area

The study area for the methodological trial was located in the Guanacaste Conservation Area (ACG) in the far North West of Costa Rica, which roughly covers the northern part of the province of Guanacaste (see Appendix 1). Regional Conservation Areas are the primary unit of natural resource management in Costa Rica (SINAC, n.d.). The ACG has experienced significant land-use/ land-cover change (LUCC) (Calvo-Alvarado, McLennan, Sánchez-Azofeifa, & Garvin, 2008). It had extremely high rates of deforestation up to the late 1980s followed by considerable but fragmented forest regrowth (Arroyo-Mora, et al., 2005). To date, no scientific studies have systematically examined the social drivers of this LUCC.

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[7] Some authors make a clear distinction between RRA and PRA (Berardi, 2002; Chambers, 1994b; Goebel, 1998). RRA is seen to focus on increasing the knowledge and capacity of external researchers and manager, while PRA focuses on empowering local people to influence research and management.

3.3.2 Research design

An overview of Oriented Qualitative Case Study is provided in Appendix 5. This methodology is novel within qualitative research of LUCC, and possibly within qualitative research more generally. Following an initial review of the regional land-use context in the study area (component 1), a small-scale, in-depth study is conducted in one community ("the reference community", component 2). Findings from this community study are then used to orient a more streamlined regional study (component 3). The regional study focuses on identifying what is similar and/or different in multiple other communities ("comparison communities") compared to the situation found in the reference community. Less data is collected in this component than is standard in qualitative research. Following this, interviews with management representatives are conducted to provide additional data to cross-check and confirm the results of the streamlined study (component 4). All data is then summarised and analysed, again using less in-depth methods than are standard in qualitative research (component 5).

Oriented Qualitative Case Study draws from the approach of RRA, as well as embedded case study and techniques used in agent-based land-use modelling (see Table 3.1). It seeks to capitalize on the desirable characteristics of each of these three approaches, while avoiding each of their main limitations. It uses more streamlined data collection and analysis as does RRA, while adopting additional measures to avoid the loss of credibility that occurs in some RRA studies. From embedded case study, it takes the benefits of using multiple sub-cases to investigate a single complex case (Scholz & Tietje, 2002; Yin, 2003), but avoids the long time periods generally required to conduct multiple, in-depth case studies. From agent-based land-use modelling, it adopts the technique of using an in-depth case study to orient a larger, more streamlined regional study (Castella, Trung, & Boissau, 2005; Janssen & Ostrom, 2006). This involves asking land users across a regional study area to identify differences between the initial small-scale model and their own decision-making processes. The new information is then incorporated into a more complex regional-scale model. As is necessary in this approach in agent-based modelling (Castella, et al., 2005), Oriented Qualitative Case Study uses independent data (from management representatives, Component 4) to cross-check and confirm the findings obtained from the streamlined regional study.

3.3.3 Data collection and analysis

As this study was part of a doctoral research project, all data collection and analysis were undertaken by a single researcher. Data was collected in the field from April to July of 2007. The five components of the methodology occurred roughly in chronological order, but had some overlap between them. Table 3.2 describes the data sources, collection methods, and analysis used in each component. As the measures used to protect research quality were evaluated as a part of the trial, they are presented in the results, below (see section 3.3.4).

3.3.3.1 Component 1

In the review of the regional land-use context, data was gathered from secondary sources, as well as from preliminary, informal interviews with management representatives. These sources are outlined in more detail in Table 3.2. The data was compiled and used to select a reference community for component 2 and to develop initial interview guides. It was analysed in component 5.[8]

3.3.3.2 Component 2

In the in-depth community case study, one-on-one semi-structured interviews were conducted with 13 land users and two community leaders from the reference community (see Appendix 10, Table 10-1 for a complete list of participants and their characteristics). Interviews were open and exploratory to allow new and unanticipated information to emerge. Sampling was purposive, with participants selected through a mix of snowball and maximum variation sampling.[9] All participants were asked about their own land-use practices as well as those of others in their communities. Questions focused on local land-use history, current farming activities and land uses, local economic development, social organization and government agencies, environmental change, environmental awareness, and future land use. A copy of the Interview Guide is provided in Appendix 7. Interviewing continued until data saturation (e.g. no new relevant information was emerging in subsequent interviews) (Miles & Huberman, 1994, p. 74). For all but one participant (a North American land user), interviews were conducted in Spanish. As land ownership was highly concentrated and strong patterns existed in the land-use issues emerging in the interviews, data saturation was achieved with a relatively small sample size of 15 participants.

The interviews were analysed in two stages. A preliminary analysis was conducted in the field based on field notes. This was used to structure the interview guide used in the comparison communities in the next component. On completion of the fieldwork period, the interviews were transcribed verbatim in the original language and then coded (e.g. data was assigned to relevant thematic categories) using the NVivo analysis software program (Gibbs, 2002). The coding process focused on revealing causal patterns by identifying the range of relationships and causal links between variables that impact land use in some way (Miles & Huberman, 1994). This analysis produced a detailed analysis framework, based on the final set of codes, which was used to structure data analysis in the last component of the study (see Appendix 11).

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[8] The results of this component also contributed to an article currently in-press with the *Journal of Forest Ecology and Management* (Calvo-Alvarado, et al., 2008).

[9] In purposive sampling the researcher selects participants that have direct knowledge of issues relevant to fulfilling the research goals. Maximum variation sampling seeks out participants with the widest range of perspectives, knowledge and experiences; in snowball sampling participants identify other people who have knowledge of the issues of interest to the researcher (see Kvale 1996; Fossey et al. 2002).

3.3.3.3 Component 3

The streamlined regional study consisted of semi-structured interviews with land users and community leaders from four geographically distinct communities in the study area ("comparison communities"). Compared to component 2, it used a more streamlined approach to collect and analyse data. Fewer interviews were conducted in each community, with 14 landholders and four community leaders from the four different communities. Participants were again selected purposively through a mixture of snowball and maximum variation sampling. A copy of the interview guide is provided in Appendix 8. The interviews had two parts: the first part was open and exploratory and focused on the same topics as the interviews in the reference community. The second part was more structured, consisting of a list of LUCC issues the researcher had identified in the reference community, such as rising land prices and attitudes towards government agencies. Participants were asked if their own experiences and those of their neighbours were the same or different from those in the reference community. Interviews were recorded and summarised in English. They were analysed in component 5.

3.3.3.4 Component 4

The management study provided data to cross-check and confirm the results of the streamlined processes used in components 3 and 5. Management representatives and users could have very different but equally legitimate perspectives about LUCC drivers. However, managers' relevant experience with regional-level LUCC still provided an additional set of data that was useful for confirming the results of the streamlined regional study to the extent that managers' perspectives reinforced those of the land users. Interviews were conducted with 12 key informants who represented relevant regional offices of government agencies at both provincial and municipal levels, as well as relevant industries and a local environmental organization (see Appendix 10, Table 10-2). Selection of participants was purposive. Again, interviews were open and exploratory to allow new and unanticipated information to emerge. Questions focused on the role of the agency and factors influencing land-use change across the region. A copy of the interview guide is provided in Appendix 9. These interviews were also summarised in English and analysed in component 5.

3.3.3.5 Component 5

In the cross-scale analysis, the data from the reference and comparison communities was summarised and partially ordered (Miles & Huberman, 1994, p. 213) into six thematic matrices that listed each participant's relevant responses individually. Each matrix represented a key theme of the analysis framework prepared in component 2 (see Appendix 11). Examples are Conservation and Environmental Awareness, Local Land Use, and Economic & Human Development. An excerpt of the Local Land Use matrix is provided as an example in Table 3.3.

Using the completed matrices as a base, charts were developed that displayed sets of LUCC drivers that interacted across scales (Miles & Huberman, 1994, p. 213).

Charting approximately followed the process for developing "causal networks" described by Miles and Huberman (1994, p.151-164). First, a complete list was made of all causal links and relationships identified by participants in each matrix. The links and relationships were grouped according to scale. The scales used were: individual, local, regional, and supra-regional. An additional grouping was interactions related to biophysical conditions. The charting process enabled the most important sets of cross-scale interactions that drove LUCC to be identified. They included sets of interactions related to globalization, social and geographic isolation, and accessibility to new opportunities (shown as an example in Figure 3-1).

In the final step, the data from the review of the regional land use context (component 1) and the results of the management study (component 4) were also partially ordered into matrices according to the key themes, and used to contextualise and triangulate, or cross-check, the findings.

3.3.4 Results

The substantive results of the present study are reported elsewhere (see Chapter 4), and so are not repeated in this chapter. However, an assessment of the strengths and limitations of the trialed methodology was conducted to evaluate its effectiveness for achieving both the substantive and methodological goals of the study. The assessment had two components: 1) a self-assessment by the researcher that drew on field notes made throughout the research process in two brainstorming sessions; and 2) a peer debriefing (Tashakkori & Teddlie, 1998, p. 91). The peer debriefing consisted of a 1.5 hour group workshop with three faculty and three graduate students from the Human Geography program at the University of Alberta. Participants evaluated the research design and methods in an open discussion format. In recognition of manager's time constraints, a similar debriefing with natural resource managers in the study area was not included.

The results from both the self-assessment and peer debriefing were summarized and combined into tables presenting the key strengths and limitations identified in the assessment. Primary strengths and limitations were those identified most strongly in the assessment, while secondary strengths and limitations were still considered to be significant, but to a lesser degree. Each of these strengths and limitations are discussed below.

3.3.4.1 Primary strengths

Two primary strengths of the methodology were identified (see Table 3.4). The first primary strength was that it produced a holistic picture. This was due largely to the qualitative approach used in the study. The focus of qualitative research on whole cases in their natural settings (R. B. Johnson & Onwuegbuzie, 2004; Willis, 2007, p.188-90) means they are able to examine interactions between components in complex systems. In the present study, the qualitative approach enabled LUCC drivers at multiple scales to be identified, including externally-driven influences such as changes in export markets. In addition, structuring interviews in comparison communities to identify similarities and differences compared to the reference community also enabled smaller-scale drivers of LUCC to be identified. Using this compare-and-contrast technique, a number of key reasons for differences between LUCC patterns in different communities were quickly identified. This technique also revealed interactions between factors at different scales. For example, the distance of some communities from urban and tourist areas restricted their access to markets and off-farm income sources, education, and social networks.

The second primary strength of the methodology was that it better matched shorter management timelines than if it had used standard qualitative methods. This was enabled by streamlining data collection in component 3 (regional study), and data analysis in component 5 (cross-scale analysis). The entire data collection and analysis process took approximately nine months for a single researcher to conduct. Based on the time taken to collect and analyze the more in-depth study of the reference community in component 2 (approximately 2.5 months), the research process could have taken up to twice as long to complete using standard methods of qualitative research that require in-depth studies to be conducted in each community. In cases where a team of researchers could be used, the research process could be streamlined even further. The use of teams for this purpose is common in RRA studies (Chambers, 1994a).

3.3.4.2 Secondary strengths

The methodology also had two secondary strengths (see Table 3.5). First, the study area was a better match to the regional management area, the Guanacaste Conservation Area, than would be achieved in the same timeframe using standard qualitative methods. Data was collected from five different geographically-distinct communities in the study area, across two municipalities. This covered the dry, un-irrigated zone of the regional management unit, the Guanacaste Conservation Area. As this study area did not completely match the entire management area, this strength was not includes as a primary strength (see also section 3.3.4.4). The better match to the regional management area was also enabled by streamlining components of data collection and analysis. The only alternative for conducting the study using standard qualitative methods within the same timeframe would be to include fewer communities. However, this would restrict the scale of analysis by compelling a smaller study area. In contrast, because of its more streamlined approach, the methodology was able to use a regional scale of analysis while also maintaining a shorter timeline.

The second secondary strength of the methodology was that it reduced the quality trade-offs caused by streamlining the research process. As discussed above, it is incredibly difficult to streamline qualitative research without compromising its credibility. However, the methodology achieved this by excluding time-consuming quality measures such as respondent validation and data saturation and adopting alternative, timelier measures to off-set any loss of quality. This strength is not included as a primary strength because trade-offs in quality were not completely avoided.

The methodology reduced three key quality trade-offs caused by streamlining the research process. First, collecting less data in the comparison communities could lead to over-representation of the reference community (see item 2a in Table 3.5). One way this trade-off was reduced was through ***careful selection*** of the reference community. The review of the regional land-use context conducted in component 1 enabled the researcher to select a community known to have experienced greater impacts from LUCC. It therefore offered the greatest opportunity to create new knowledge. This is known as a "critical" or "revelatory" case (Yin, 2003 p. 23). In addition, the selected community was a vulnerable population because of a high poverty level, as well as social and geographical isolation. Land users in this community therefore had little economic or social power to influence land-use management through other channels. A degree of over-representation was therefore also accepted in the study as it gave a stronger "voice" to otherwise underrepresented and disempowered land users (Baez, 2002).

Another way that over-representation of the reference community was reduced was the ***compare-and-contrast interview technique*** employed in the comparison communities. Using this technique, interviews actively sought out experiences and opinions that were different to those of the landholders in the reference community. This enabled the researcher to explore "negative cases" in the comparison communities that disconfirmed interpretations based on the data from the reference community (Baxter & Eyles, 1997; Fossey, et al., 2002). This technique increased the amount of new data generated in the comparison community interviews, and enabled key differences between these communities and the reference community to be identified despite the fact that fewer land users were interviewed.

The final way that over-representation of the reference community was reduced was through the ***suitability of the methodology for the research setting***. In the present study, the use of an in-depth community study to orient a more streamlined regional study was possible because there was a relatively low degree of social and cultural diversity in the study area. In contrast, in a setting with a high degree of social and cultural diversity, variations between different communities would be too extreme to be able to use this approach to make useful comparisons to a single reference community. Too much information would be missed, and the results would be too biased towards the conditions found in the reference community. Determining suitability of the methodology to the research setting required the researcher to familiarize herself with the study area before designing the methodology.

The second quality trade-off reduced in the methodology was researcher bias and misinterpretation during analysis due to the less detailed process used in component 5 (cross-scale analysis) (see item 2b, Table 3.5). This threat was off-set by using two measures: structuring analysis with a prior analysis framework, and triangulation of multiple data sources. The ***prior analysis framework*** was based on the rigorous analysis of in-depth data in component 2, and it served as a point of reference to counter the researchers' own interpretations and assumptions. In addition, the same researcher that conducted the streamlined analysis of the interviews from the comparison communities also conducted the in-depth community case study and developed the analysis framework. Familiarity with data in this way facilitates the researcher's grasp of the range and diversity of information, as well as its context, enabling a more informed interpretation (Ritchie & Spencer, 2002). ***Triangulation of multiple data sources*** (Baxter & Eyles, 1997; Maxwell, 2005p. 105-116) provided a cross-check of the researcher's interpretations that prevented the less-detailed analysis from allowing greater researcher bias than in a more detailed process.

The third quality trade-off reduced in the methodology was unacceptable under-representation of difficult-to-access land-users. Again, the ***suitability of the research methodology for the research setting*** was the measure used to reduce this trade-off. Difficult-to-access land users in the present study area were predominantly large, powerful land users. Their under-representation was therefore accepted in the study because these users are more likely to influence natural resource management through other channels. Because the study area is well-developed, all land users are easily accessible by road. Were this not the case, the study could be open to criticism of "road-side" or convenience sampling that has led isolated and marginal groups to be under-represented in some RRA studies (Binns, Hill, & Nel, 1997). Alternatively, this threat could be avoided in future studies by having researchers from outside the study area connect with a local researcher or contact that could facilitate finding participants.

3.3.4.3 Primary limitations

Two primary limitation of the methodology were also identified (see Table 3.6). The most significant limitation of the methodology was that it may have overlooked some community-level factors that influence LUCC in the comparison communities. Insufficient data was collected in each comparison community to achieve data saturation on these factors (Miles & Huberman, 1994, p. 74). Because of this, the methodology could not examine community-level drivers of LUCC in these communities as fully as in the reference community. Consequently, where small-scale factors were identified in either the reference community or a given comparison community but not in both, it was unclear whether these factors were specific to the one community, or whether they had been overlooked in the comparison community. For example, in the reference community, a number of land-users indicated that they would not participate in the current financial incentive program for forest conservation and reforestation, Payments for Environmental Services (PES), because neighbours reported negative experiences with similar past incentive programs. However, this same issue was not identified in any of the comparison communities. Using Oriented Qualitative Case Study, it was not possible to determine whether this issue was specific to the reference community or if it had been overlooked in the comparison communities because of insufficient data.

However, this limitation did not restrict the identification of other small-scale factors that existed in different forms in more than one community. Through the compare-and-contrast technique used in the comparison community interviews small-scale factors were identified when they existed in all or most communities. An example is proximity to urban and tourist areas. This proximity, or alternatively distance, impacted LUCC in each community differently, increasing the economic and land-use opportunities in some communities while restricting them in others. However, because this factor was influential in some way in every community, it was indicated in a larger number of interviews and was therefore easily identified.

The second primary limitation was limited engagement with regional managers. Engagement with managers was limited by the researcher's remoteness from the study area outside of the field work period, and by unanticipated events occurring during fieldwork that monopolized manager's time. Having the researcher based in Canada, geographically remote from the study area, greatly restricted the opportunity to connect with managers in an ongoing way. Meanwhile, managers' time was monopolized during the fieldwork period by a number of large wild fires in the national parks and by a large-scale agricultural expo. Limited engagement with regional managers is a particularly pertinent limitation given that the aim of the trial was to increase the relevance of the research findings to those managers. As the trial evaluated methodological challenges for contributing to management with qualitative research rather than engagement challenges, communication with managers was not a primary focus. However, greater engagement between the researcher and managers in an ongoing way would have enabled the researcher to better design the study with the specific information needs of managers in mind, and to support regional manager by sharing the research findings.

3.3.4.4 Secondary limitations

Finally, the one secondary limitation of the methodology was that the study area was an incomplete match to the regional management area, the Guanacaste Conservation Area (see Table 3.7). However, the match was better than if a single, community case study had been used. As a result, the increased, but incomplete, match to the area of the management unit is both a secondary strength of the methodology and a secondary limitation. It was incomplete largely because the process of familiarizing the researcher with the study area in component 1 was more time-consuming than anticipated. It took approximately one month of fieldwork time, leaving less time for data collection. As a result, fewer communities were included in the study, and data was not collected across the entire management area as initially planned. Instead, data was collected from communities located in the dry, un-irrigated region of the Guanacaste Conservation Area. Data collection focused on this area for two reasons. First, the study was conducted under the research program of the Tropi-Dr Collaborative Research Network that investigates tropical dry forest ecosystems. Second, the priorities, and therefore information needs, of natural resource management are more likely to be similar within a single ecological zone with evenly distributed water access than across multiple ecological zones with varied water access.

3.4 Discussion

Oriented Qualitative Case Study makes two interrelated trade-offs between different elements of research design. As is always the case with trade-offs, this involves accepting losses in some elements to make gains in others. In particular, it loses some of the depth of information that is obtained in comparison communities in exchange for gaining a larger scale of analysis that better matches the regional management unit. It also loses a degree of credibility by streamlining some stages of the research process in order to gain a better match to managers' shorter timelines.

It is important to recognize that all research makes such trade-offs, regardless of whether it seeks management relevance or not. However, different research designs involve different types of trade-offs. Figure 3-2 compares the trade-offs made by Oriented Qualitative Case Study to those made by four typical qualitative research approaches: single case study, multiple case study (which includes embedded case study), RRA study, and program evaluation. In practice, studies using each of these research approaches vary considerably in quality and scope. Figure 3-2 is presented as a generalization of the trade-offs made by these approaches rather than an accurate description of their use in practice.

Each of the approaches shown in Figure 3-2 loses and gains something through the primary scale of analysis it uses (X-axis), and in the relative priority it gives to credibility and timeliness (Y-axis). For example, single case studies tend to use a small scale of analysis, and to give greater priority to credibility than timeliness. In this way, they gain a high degree of research quality and a greater ability to examine complex problems in-depth compared to Oriented Qualitative Case Study. However, they lose a degree of management relevance. Similarly, each of the other approaches also make trade-offs amongst the same factors, but each makes different types of trade-offs, and each one gains and loses something different as a result. In comparison to the four typical approaches, Oriented Qualitative Case Study makes a more balanced trade-off between primary scales of analysis, and between credibility and timeliness.

Two important points regarding the quality of research, particularly applied, management-relevant research are highlighted by the present study. First, the quality of a given research approach can only be evaluated in the context of the goals and setting of the particular study (Maxwell, 2002; Tashakkori & Teddlie, 1998; Willis, 2007, p. 95-156). This applies to basic research as much as it does to applied research. In the context of the present study, the more in-depth approach of a multiple case study, for example, would not be a suitable methodology because it would be unable to fulfil the goal of matching managers' shorter timelines and larger scales. A research design that does not fulfil these goals cannot be considered high quality. This suggests using a pragmatic approach to design research, in which the practical requirements of the research are the most important factors for determining methodology, rather than a preferred epistemology or theoretical approach (R. B. Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998; Whittemore, Chase, & Mandle, 2001).

Second, the present study highlights that research quality is multi-faceted, involving more than just a high degree of credibility. Cash et al. (2002; 2003) emphasize this point by distinguishing between three key aspects of research quality: credibility, salience and legitimacy. Credibility is the trustworthiness of scientific findings. Salience is the relevance of research to decision-makers or the public, and legitimacy is its fairness to different values, concerns and perspectives. While credibility is generally the primary concern of researchers when they consider research quality (Cash, et al., 2002), it is insufficient on its own for determining overall research quality. Prioritizing credibility while disregarding salience and legitimacy can result in research that is ignored and therefore ultimately has little impact (Cash, et al., 2002; Cash, et al., 2003). Seen in this light, the trade-offs outlined in Figure 3-2 involve different competing elements of research quality, the relative importance of which will vary from study to study. Oriented Qualitative Case Study is a methodology that is best-suited to studies where a high degree of salience is required, and a lesser degree of credibility is acceptable. It is therefore well-suited to applied research but less suited to basic research that does not prioritize salience as highly.

The present study also highlights the degree of creativity and flexibility that qualitative researchers have at their disposal (Whittemore, et al., 2001), and the opportunities this provides for fitting research to the information needs of managers. In particular, taking strategic advantage of the flexibility available in selecting quality measures can reduce the extent of credibility that must be traded-off to gain timeliness in applied qualitative research. Part of the research process in the present study was streamlined by relaxing some quality measures that were too time-consuming, and offsetting the threat this posed to quality with alternative quality measures. This was possible because qualitative research does not rely on a single quality measure or a rigid set of established, universal measures to ensure high quality in all studies (Baxter & Eyles, 1997; Rolfe, 2006; Whittemore, et al., 2001). Rather, qualitative researchers draw selectively from a suite of possible quality measures. The cumulative effect of adopting a range of measures selected specifically by the researcher to fit the particular study, offers the best protection against threats to quality. Providing that researchers use a range of measures that adequately protect overall quality, they have considerable flexibility in choosing the measures that best fit with the particular goals of their studies. This opens up the opportunity to make creative use of this flexibility to design studies that better fit the needs of managers.

3.5 Conclusions

The complexity of social-ecological systems increases the need for research that can support natural resource management. While basic research also has an important role in natural resource management, applied research that seeks to enable solutions is increasingly called for. At the same time, applied research requires methodologies that make different types of trade-offs between elements of quality than mainstream, basic research. In particular, applied research studies need approaches that prioritize salience. Importantly, this does not negate the requirement to maintain a high degree of credibility at the same time.

Oriented Qualitative Case Study is a methodology that can increase the salience of qualitative research for natural resource management. It can increase the fit of research to managers' information needs by better matching management timelines and scales. In doing this, it reveals the opportunities that researchers have to creatively use the flexibility of qualitative research to design studies to fit managers' needs.

3.6 Table and Figures

3.6.1 Tables

Table 3.1: Three research approaches drawn on by Oriented Qualitative Case Study

Approach	Examples	Description	Desirable characteristic	Limiting characteristic
Rapid rural appraisal (RRA)	(Bolland, et al., 2006; M. E. Brown, 2006; Vogt, et al., 2006)	Collection of methods for gathering qualitative data in a timely manner	Increases timeliness by streamlining data collection and analysis	May employ insufficient measures to protect research quality, resulting in loss of credibility
Embedded case study	(Scholz & Tietje, 2002)	Examines a single complex case by investigating individual sub-cases, then combining them into a holistic analysis	Uses multiple sub-cases to investigate a single complex case	Time-consuming, and therefore restricted to small-scales of analysis, e.g. a single organization
Regional-scale agent-based modeling	(Castella, et al., 2005)	Uses a small-scale model to develop a regional model by comparing and contrasting the initial model to situations in other locations in the region	Increases the regional applicability of an initial, small-scale model (e.g. "up-scales" the model)	Requires cross-checking against independent data to confirm its consistency and the legitimacy of the final model

Table 3.2: Summary of data collection methods, data sources, and analysis methods used in the methodological trial

	Collection methods	**Data sources**	**Analysis methods**
Component 1 Review of Regional Context	Literature review	Government reports, scholarly articles & books	Compiled and analyzed in Component 5
	Socioeconomic data	Costa Rican Institute of Census & Statistics Ministry of Planning; 2000 Agricultural census.	
	National print media	La Nación; La República	
	Informal interviews	Representatives of regional government offices	
	Review of LUCC studies in Latin America	Databases of peer-reviewed journals	
Component 2 In-depth Community Case Study	Open & exploratory semi-structured interviews	13 land users & 2 community leaders (from reference community)	Interviews transcribed verbatim & coded using NVivo to identify key themes
Component 3 Streamlined Regional Study	Targeted semi-structured interviews	14 land users & 4 community leaders (from 4 comparison communities)	Interviews summarized and analysed in Component 5
Component 4 Management Study	Open and exploratory semi-structured interviews	12 management & industry representatives	Interviews summarized and analyzed in Component 5
Component 5 Cross-Scale Analysis	N/A	Results of analysis from Components 2 & 3	Data from components 2 & 3 partially ordered into thematic matrices; Data contextualised & triangulated with findings from components 1 and 4

Table 3.3: Excerpt of the Local Land Use matrix prepared in Component 5

ID	Agriculture	Traditional cattle-farming	New farm activities/ methods
Ref-1	Because it doesn't rain, it is a cattle zone not an agricultural zone	Small farmers have cattle and sell cheese because there is nothing else to do	N/A
Ref-2	Not apt for agriculture now because region is too dry	Small farmers have cattle but it is economically difficult in Summer because they have to buy supplementary feed	Farm methods haven't changed at all, except new pastures introduced years ago, funded by the Dutch Embassy

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cC-1	Lack of good Winters have reduced agriculture	Cattle-farming is doing okay – price fell but recovered; better on farms with good water access	N/A
cC-2	Less agriculture now because farming methods changed	Less cattle now – in past money was worth more, small farmers worked on nearby haciendas. Now there is no farm work	There is more machinery now, less manual labour
cC-3	Less agriculture now because there is no market anymore; Winters are not as good	People had to look for work in towns because there was none on farms; some sold their land and left	CORFOGA has a credit fund to assist farmers to improve methods – e.g. new blood lines, new pasture species; some now grow sugar cane using the resources of the processing plants, they don't have to invest their own money

Table 3.4: Primary strengths of Oriented Qualitative Case Study

Primary Strengths	Description	Explanation/ Examples
1. Produced a holistic picture	Identified multi-scale drivers of LUCC, including: a. Large-scale, externally-driven influences originating outside the study area b. Regional institutions and networks that mediated large-scale influences c. Small-scale factors that existed in some form in all or most communities	• Changes in export markets, e.g. beef; arrival of foreign investors; international environmentalism promoted by government policies • Expansion of communications and transport networks; resource restrictions in the delivery of the system of land-clearing permits. • *Locations:* Biophysical conditions, e.g. water access, steep inclines; proximity to urban areas and tourist locations • *Users:* Levels of education; participation in industry associations; access to off-farm income.
2. Better match to shorter management timelines	Streamlining data collection and analysis enabled the research to better fit managers' needs for timely information to support decision-making	• Data collection in the four comparison communities took approximately one month in total, compared to 3 weeks for the reference community. • Component 5, the cross-scale analysis of all interview data, took approximately 1.5 months, compared to 1.5 months to analyze data from the reference community alone in Component 2.

Table 3.5: Secondary strengths of Oriented Qualitative Case Study

Secondary Strengths	Description	Explanation/ Examples
1. **Better match to regional management area**	Study had a regional study area that better-matched the area of the regional management unit	• Streamlining of the research process enabled data to be collected from five different geographically-distinct communities in the dry, un-irrigated zone of the regional management unit, the Guanacaste Conservation Area
2. **Reduced quality trade-offs**	Three key quality trade-offs caused by streamlining research process reduced:	
	a. Reduced over-representation of the reference community	• ***Careful selection*** of a community that provided the greatest opportunity to generate new knowledge; a degree of over-representation also gave "voice" to vulnerable landholders that were underrepresented though other channels. • ***Compare-and-contrast interview technique*** actively sought out differences between comparison communities and the reference community. • ***Suitability of the methodology for the research setting*** *was* determined prior to data collection. In particular, researcher determined that social and cultural diversity was not high.
	b. Reduced researcher bias and misinterpretation during analysis	• Use of a ***prior analysis framework*** provided a point of reference to counter researcher's interpretations and assumptions. • ***Triangulation of multiple data sources*** (different types of land users, management representatives, and secondary data) cross-checked the researcher's interpretations.
	c. Reduced unacceptable under-representation of difficult-to-access land users	• ***Suitability of the methodology for the research setting*** avoided unacceptable under-representation because difficult-to-access land users were large cattle ranchers, and tourism and residential developers. A degree of under-representation was therefore accepted as these land users are able to influence natural resource management through other channels.

Table 3.6: Primary limitations of Oriented Qualitative Case Study

Primary Limitations	Description	Explanation/ Examples
1. Overlooked some community-level factors	Was unable to determine whether or not community-level factors identified in either the reference community or a given comparison community but not both, were due to insufficient data	• A number of community-level factors were identified in the reference community only. Examples are lack of faith in community-led projects, neighbours' negative experiences with past government conservation programs. • Methodology could not determine if these factors were absent in comparison communities, or had been overlooked because of insufficient data
2. Limited engagement with regional managers	Researcher remoteness limited researcher's engagement with regional managers	• Researcher's remoteness from the study area outside of the fieldwork period restricted ongoing contact with regional managers • During field work, regional managers' time was monopolized by a number of wild fires in national parks and a provincial agricultural expo.

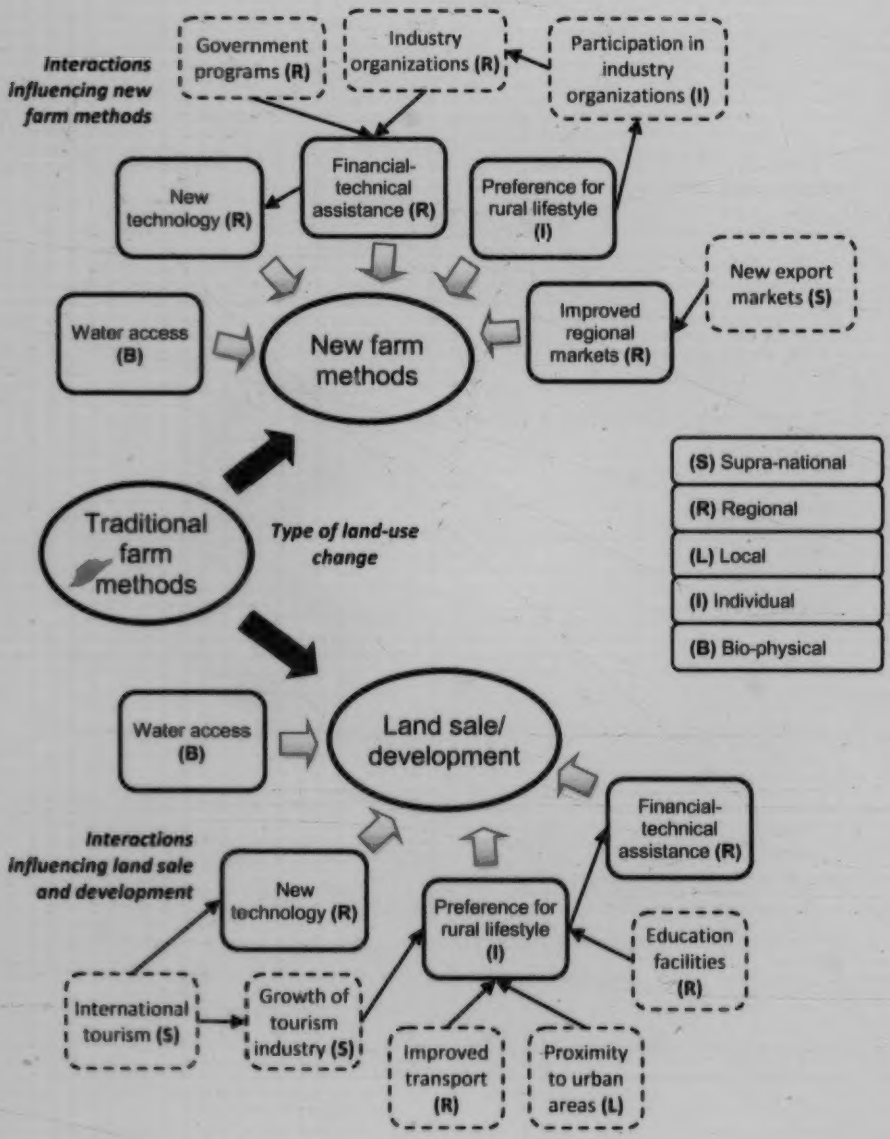
Table 3.7: Secondary limitations of Oriented Qualitative Case Study

Secondary Limitations		Explanation/ Examples
1. Incomplete match to regional management area	The study area was restricted to the dry, un-irrigated region of the Guanacaste Conservation Area.	• Familiarizing researcher with the study area was time consuming, reducing the time available to collect data and restricting the number of communities included.

3.6.2 Figures

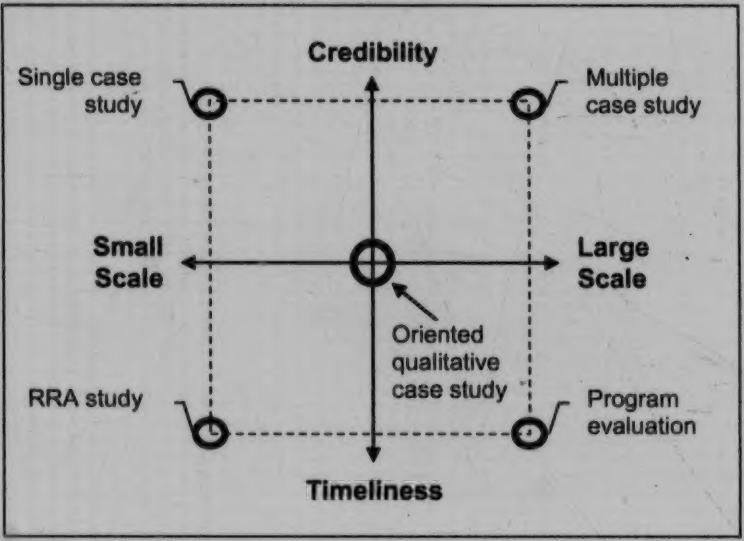
Figure 3-1: Example of a chart prepared in Component 5

Shows sets of interactions related to accessibility to new opportunities reported by respondents (arrows indicate direction of influence)



Interactions influencing new farm methods
Government programs (R)
Industry organizations (R)
Participation in industry organizations (I)
New technology (R)
Financial-technical assistance (R)
Preference for rural lifestyle (I)
New export markets (S)
Water access (B)
New farm methods
Improved regional markets (R)
Traditional farm methods
Type of land-use change
(S) Supra-national
(R) Regional
(L) Local
(I) Individual
(B) Bio-physical
Water access (B)
Land sale/ development
Financial-technical assistance (R)
Interactions influencing land sale and development
New technology (R)
Preference for rural lifestyle (I)
Education facilities (R)
International tourism (S)
Growth of tourism industry (S)
Improved transport (R)
Proximity to urban areas (L)

Figure 3-2: Trade-offs made in Oriented Qualitative Case Study compared to four typical qualitative research approaches


Credibility
Single case study
Multiple case study
Small Scale
Large Scale
Oriented qualitative case study
RRA study
Program evaluation
Timeliness

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4 Inside a forest transition: Linking forest recovery processes and changes in landholder livelihoods

> *Some people believe that the tropics shouldn't produce anything; you should just see the trees, the pretty things in photos. For the future children, we still can't forget the present children. Everything begins with the present.*
>
> \- Guanacastecan cattle farmer

4.1 Introduction

Forest recovery is the process of secondary (regrowth) forests returning to areas that were once naturally covered with primary forest but later cleared through human activity.[1] Secondary forest makes up a significant and increasing percentage of the world's total forest cover. According to the Food and Agriculture Organization (FAO) of the United Nations, over half the world's 2005 forest area was made up of secondary and other modified, natural forest (FAO, 2006, p. 13).[2] While not as biodiversity-rich as primary (natural or pristine) forest, secondary forest can make important sustainability contributions. For example, it can restore important forest ecosystem services, deliver economic benefits to rural populations, and reduce pressure to extract timber from remnant primary forests (S. Brown & Lugo, 1990; Chazdon, 2008; Lamb, Erskine, & Parrotta, 2005; Wright & Muller-Landau, 2006).[3]

Despite the sustainability potential and increasing area of secondary forest, the ecological and social aspects of secondary forest dynamics and conservation are relatively understudied (Barlow, et al., 2007; S. Brown & Lugo, 1990; Chazdon, 2008; Hecht & Saatchi, 2007). Partly due to this, secondary forests are also widely overlooked in forest conservation efforts. The great bulk of forest conservation programs focus on remnant primary forests located in protected areas but exclude human-modified forests located in agricultural landscapes (Chazdon, et al., 2009; Harvey, et al., 2008). While the study and conservation of primary forests remains a high priority, this situation has left a large gap in our knowledge of increasingly extensive and potentially valuable secondary forest (Chazdon, et al., 2009). Furthermore, this research gap is becoming ever-more significant as secondary forests continue to increase in area and provide a growing proportion of the world's forest ecosystem services relative to primary forests (Chazdon, 2008).

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[1] Most definitions of forest recovery exclude exotic timber plantations, for example Brown and Lugo (1990). However there are exceptions to this, see Farley (2007) and Izquierdo et al. (2008).

[2] According to the FAO definition, modified natural forest includes both forest that has regenerated on cleared land (secondary forest) as well as other regenerated forest that shows clear signs of human activity (FAO, 2006).

[3] For less positive assessments of the sustainability potential of secondary forests, see (Barlow, et al., 2007; Farley, 2007; Gardner, Barlow, Parry, & Peres, 2007).

The current chapter contributes to mounting efforts to fill this research gap to facilitate forest conservation and promote sustainability in human-dominated landscapes. It reports on a study that examined linkages between the processes driving forest recovery on private property (hereafter "forest recovery processes") and changes in landholder livelihoods in one rural area of Latin America: Costa Rica's dry North West. The goal of the study was to examine the sustainability and management implications of forest recovery processes in this area. Although deforestation continues to be the dominant trend in forest cover dynamics in Latin America today, empirical studies show that secondary forests are recovering at increasing rates in locations across the region (see for example Bray & Klepeis, 2005; Hecht, Kandel, Gomes, Cuellar, & Rosa, 2006; Kull, Ibrahim, & Meredith, 2007; Sloan, 2008). However, the lands on which these forests are located are also important livelihood resources for rural populations (Kay, 2004; Loker, 1996). Consequently, forest recovery processes impact social sustainability as well as environmental sustainability (Harvey, et al., 2008; Hecht & Saatchi, 2007; Kull, et al., 2007; Lamb, et al., 2005).This is particularly true in the case of secondary forests that, unlike remnant primary forests, are largely located in human-dominated, agricultural landscapes.

The study reported in this chapter used a comparative, qualitative research approach to fill in some of the gaps that exist in the dominant theory used to frame studies of forest recovery processes in Latin America: Forest Transition Theory (FTT). A forest transition is a turning point in forest cover dynamics. It occurs when rates of forest recovery outstrip rates of deforestation, leading to a net increase in forest cover (Mather & Needle, 1998; Rudel, et al., 2005). FTT links forest transitions to large-scale changes processes associated with economic modernization (Mather & Needle, 1998; Rudel, 2005; Rudel, et al., 2005). However, FTT overlooks the influence of locally-specific factors (Bray & Klepeis, 2005; Chowdhury, 2007; Sloan, 2008) and cross-scale interactions associated with globalization (Hecht & Saatchi, 2007; Kull, et al., 2007; Schmook & Radel, 2008). Furthermore, it fails to consider the impact of forest recovery processes on rural livelihoods and the consequences that changing livelihoods may have on long-term sustainability. The present study therefore draws on the complementary approach of livelihoods research (Bebbington, 2004; Scoones, 2009) to explicitly examine these overlooked aspects of forest recovery processes.

4.2 Theoretical approach

4.2.1 Forest Transition Theory

Forest Transition Theory (FTT) is a generalized theory (Mather & Needle, 1998; Rudel, et al., 2005). It explains relationships between large-scale, socioeconomic forces associated with modernization, and large-scale patterns of forest recovery that occur at national or cross-national levels over periods of a decade or more (Walker, 2008). It originally developed to explain how modernization in Western countries during post-World War II industrialization led to forest recovery (Mather & Needle 1998). More recently, it has been re-invoked to explain forest recovery in developing countries (Perz, 2007; Rudel, 2005).

According to FTT, economic modernization leads initially to deforestation as land is cleared for agriculture and timber extraction (Mather & Needle, 1998; Perz, 2007; Rudel, 2005). As the economy modernizes further, however, processes such as industrialization, rural-to-urban migration, and agricultural intensification encourages landholders to abandon marginal agricultural land, allowing forest to regenerate. At the same time, increasing demands for timber in urban areas and growing awareness of the ecosystem services of forests promote reforestation and forest conservation. FTT therefore implies that the way for developing countries to recover forests is to modernize their economies in the same way that Western countries did during their industrialization period (Klooster, 2003).

FTT's ability to explain forest recovery in the Latin American context is limited for two key reasons. *First,* it overlooks the important influences of globalization. Globalization is the increasing interconnectedness and movement of capital, production, people, information, ideas and culture around the world (Lambin, et al., 2001; Young, et al., 2006; Zimmerer, 2006). Globalization has produced a set of large-scale socioeconomic conditions in Latin America that are qualitatively and quantitatively different to the conditions that existed in Western countries during their forest transitions (Baptista & Rudel, 2006; Kull, et al., 2007). For example, empirical studies show that processes such as international migration, global environmental networks and ideologies, technology transfer, war, free trade agreements, and international tourism have contributed to forest recovery in different locations in Latin America in ways that are not adequately explained by FTT (Baptista, 2008; Hecht, et al., 2006; Hecht & Saatchi, 2007; Klooster, 2003; Kull, et al., 2007; Schmook & Radel, 2008).

Second, because of its generalized nature, FTT is insensitive to the locally-specific factors that influence forest recovery at smaller scales. Empirical studies show that what is particular and specific about locations influences forest recovery in important ways. For example, processes of forest recovery are shaped by past land use (Bray & Klepeis, 2005; Sloan, 2008); local biophysical conditions (Abizaid & Coomes, 2004; Perz & Skole, 2003); household characteristics, strategies and lifecycles (Abizaid & Coomes, 2004; Chowdhury, 2007); and landholder's access to resources and capital (Perz & Skole, 2003; Southworth & Tucker, 2001). Forest recovery may also be promoted or restricted by the influence of local institutions and organizations (Hecht, et al., 2006; Klooster, 2003; Southworth & Tucker, 2001; Tucker, Munroe, Nagendra, & Southworth, 2005) and local economic conditions (Parés-Ramos, Gould, & Aide, 2008).

The common use of FTT to frame empirical studies of forest recovery at subnational levels has led to gaps in our understanding of forest transitions in the Latin American context. In order to fill these gaps research needs to move away from its reliance on FTT to use more disaggregated, less generalized approaches

(Chowdhury, 2007; Hecht & Saatchi, 2007; Redo, Joby Bass, & Millington, 2009; Sloan, 2008). Such approaches can be used to look "inside" forest transitions to reveal the locally-specific factors influencing forest transitions and identify how those factors are changing under the different socioeconomic conditions produced by globalization. This research need echoes calls made by the broader land-use/land-cover change (LUCC) research community for a research program grounded in small-scale case studies that can "un-pack" the social drivers of LUCC (Lambin, et al., 1999, p. 37-8). One approach for looking inside forest transitions is to conduct case studies that examine processes of forest recovery together with changes in rural livelihoods.

4.2.2 Livelihoods research

Livelihoods research is an approach that emerged in rural development research targeted at poverty alleviation (Carney, 2003; Ellis & Biggs, 2001; Scoones, 1998, 2009). Theoretically, it is linked to the influential endowments and entitlements framework of Amartya Sen (Scoones, 2009). Livelihoods are "the capabilities, assets (including both material and social resources) and activities required for a means of living" (Scoones, 1998, p. 5). A livelihood is considered sustainable when "it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Scoones, 1998, p. 5). Research that focuses on livelihoods offers an integrated way to examine complex and diverse rural places (Scoones, 2009). It examines the diverse issues and sectors impacting livelihoods that are often studied in isolation of each other.

The sustainable livelihoods framework is a useful way to conceptually organize the factors that impact livelihoods and the relationships between those factors (Carney, 2003; DFID, 1999; Scoones, 1998, 2009). As indicated in Figure 4-1, this framework shows that in a given ***context***, access to different combinations of ***livelihood resources***, which are mediated by ***institutions, policies and processes***, determine people's ability to pursue different types of ***livelihood strategies***, resulting in different ***outcomes*** for ***livelihoods*** and ***sustainability*** more broadly (Scoones, 1998, 2009). Livelihood resources (also referred to as "assets" or "capitals") are broken into five types (Bebbington, 1999; DFID, 1999; Scoones, 1998):

- Human - e.g. skills, knowledge
- Social - e.g. networks, relationships
- Natural - e.g. land, forest, water
- Physical - e.g. infrastructure such as roads, buildings, energy
- Economic or financial - e.g. income, credit, liquid assets

The sustainable livelihoods framework also reveals two major feedback pathways, shown again in Figure 4-1. Institutions, policies and processes impact the contextual conditions in which livelihood strategies are pursued, for example though economic policies that alter macro-economic conditions. In addition, livelihood and sustainability outcomes alter people's access to livelihood resources. For example, more sustainable use of the natural resource base will in turn increase the natural resources that people are able to access for their livelihood strategies.

Similarly to FTT, the explanatory power of livelihoods research has been challenged in the modern context by globalization (J. C. Brown & Purcell, 2005; Scoones, 2009; Woods, 2007). In general, livelihoods research has been criticized for failing to engage with research on newly emerging large-scale change processes that impact livelihoods, such as economic globalization, climate change, and long-term change in rural economies (J. C. Brown & Purcell, 2005; Scoones, 2009; Woods, 2007).

In response to such criticisms, a developing geographic stream in political ecology directly examines rural livelihood change in the context of globalization (Bebbington, 2004; Bebbington & Batterbury, 2001; J. C. Brown & Purcell, 2005; Scoones, 2009; Zimmerer, 2007; Zimmerer & Bassett, 2006). This research highlights how large-scale processes of globalization are "knitted-together" with local conditions and processes, creating varied outcomes for both livelihoods and the environment (Bebbington, 2004; Escobar, 2001; Woods, 2007; Zimmerer, 2006; Zimmerer & Bassett, 2003). Examples of the varied outcomes of globalization in rural places are livelihood diversification, economic inequality and social polarization, an increase in foreign land ownership, and intensified but diverse land-use change (Woods, 2007).

The case study presented in this chapter looked inside the forest transition occurring in Costa Rica's dry North West. It did this by linking the investigation of forest recovery processes with an examination of how landholders' livelihood strategies have changed in the context of economic modernization and globalization. The geographic stream of political ecology shows that this focus on livelihoods can be used successfully to ground studies of large-scale change processes in local places (Bebbington, 2004). In Latin America, as in many other places, the same large-scale processes driving forest recovery also drive changes in rural livelihood strategies (Bebbington, 2004; De Haan, 2000; Jianchu, et al., 2006; Kay, 2004; Loker, 1996; A. Steward, 2007; Woods, 2007; Zimmerer, 2006, 2007).

By examining forest recovery processes and changes in landholder livelihoods together, the present study contributes to research on forest transitions and rural livelihoods. It filled-in some of the gaps left by FTT in our knowledge of forest transitions in the modern Latin American context. It also addressed criticisms of livelihoods research by making direct linkages between rural livelihoods and changes associated with globalization.

4.3 Large-scale drivers of forest transition in Costa Rica's North-West

The study area is located in the most north-western corner of Costa Rica in Guanacaste province, alongside the border with Nicaragua (see Appendix 1 for a map of Guanacaste and Appendix 2 for a map of the study area). Guanacaste is one of many regions in Latin America that has experienced a forest transition (see Figure 4-2). A study by Calvo-Alvarado et al. (2008)[4] showed that forest cover declined steadily between 1960, when the first aerial photographs of land cover in Guanacaste were taken, and 1979, falling from 38.4% to 26.1%. From 1979 to 1986 forest cover remained relatively stable, declining only slightly. Following this, however, forest cover steadily increased to the point that forest covered 47% of the province by 2005, exceeding the 1960 forest area.

As in other parts of Latin America, this forest transition is linked to large-scale processes associated with economic modernization and globalization. In a review of land-use change in Guanacaste from 1960 to 2005, Calvo-Alvarado et al. (2008) identified three key large-scale processes that contributed to forest recovery: the rise and fall of the region's export-oriented beef industry, the expansion of international tourism, and environmentalism advanced through national conservation policies. Guanacaste is traditionally a cattle-ranching region, and land-use has been dominated in the past by expansive cattle grazing on large *haciendas* (Edelman, 1992). Cattle-farming declined at the end of the 1980s due to the collapse of the international beef market. This stimulated forest recovery by encouraging landholders to abandon marginal pastureland as the profitability of cattle fell and allowing forest to regenerate naturally on the abandoned land.

This forest recovery was further facilitated by a regional tourism boom that began in the early 1980s (Calvo-Alvarado, et al., 2008). The tourism industry in Guanacaste is focused predominantly on beach resorts and villas on the coasts of the Nicoya Peninsula and the Papagayo Gulf (see Appendix 1). Combined with infrastructure development, including the expansion of electricity and roads, this promoted population growth and urbanization, and drew people away from the agricultural sector. Agricultural employment statistics show that the percentage of the workforce in the primary (agricultural) sector almost halved between 1984 and 2000, falling from 56% to 28%, while employment in the tertiary (services) sector rose from 30% to 52% in the same period (INEC, 1984, 2000).

The growing influence of environmentalism promoted by national conservation policies also further facilitated forest recovery, although to a lesser degree than is often assumed (Calvo-Alvarado, et al., 2008). The development of Costa Rica's environmental conservation approach has closely followed trends in international environmental politics (see Chapter 2). It is managed through a network of regional Conservation Areas called the National System of Conservation Areas (SINAC) of the Ministry of the Environment and Energy (MINAE) (SINAC, n.d.). Three separately-managed Conservation Areas cross the territory of Guanacaste: Guanacaste, Tempisque and Arenal-Tempisque.

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[4] This study drew on data from previous forest cover analyses by Arroyo-Mora et al. (2005), (U-Alberta & CCT, 2002), and (Sánchez-Azofeifa, Calvo-Alvarado, Chong, Castillo, & Jiménez, 2006). It defined forest cover as "at least 80% forest canopy cover, and included both natural primary and secondary forest".

Three key policies frame forest management and conservation in Costa Rica, all of which have been implemented in Guanacaste: protected areas, the legal restriction of timber-cutting, and a system of payments for environmental services (PES). Over 110,000 hectares of land was put under some form of protection in Guanacaste between the 1970s and 1990s (Calvo-Alvarado, et al., 2008). While most of these areas are located on remnant forest land, others like Santa Rosa and Guanacaste National Parks were established on former pastureland and therefore contributed to the increase in forest cover (see Allen, 2001; Janzen, 1998). Since the restrictions on timber-cutting were established, both landholders and commercial loggers must obtain a permit from the ACG/MINAE office before cutting timber on private land.

Costa Rica's internationally-recognized PES system pays private landholders for the ecosystem services of forests that are submitted to PES contracts (Pagiola, 2008; Rojas & Aylward, 2003; Sanchez-Azofeifa, Pfaff, Robalino, & Boomhower, 2007). There are a variety of types of PES contracts, but the most common are contracts for forest protection and reforestation. The agency responsible for establishing PES contracts and distributing payments is the National Forestry Financing Fund (FONAFIFO). According to FONAFIFO (2009), 884 PES contracts were entered into by landholders across Guanacaste between 1998 and 2007: 555 for forest protection, 276 for reforestation and 53 for other conservation activities. These contracts cover 61,390 hectares, which is approximately 10% of the forested area in the province. However, as PES was implemented relatively recently, very little of the forest recovery observed between 1986 and 2005 can be attributed to this program (see also Calvo-Alvarado, et al., 2008).

No studies have yet examined the specific processes of forest recovery that led to the forest transition in Guanacaste. This forest transition involved many of the large-scale processes associated with economic modernization that are predicted by FTT: for example, a decline in agriculture, urbanization, an increase in off-farm employment, and the introduction of conservation policies. It also involved processes associated with globalization that are not predicted by FTT, such as export market dynamics, international tourism and international environmentalism. Significant changes in rural livelihoods are also indicated by the decline in agricultural employment and rise in service industry employment.

4.4 Study area and methodology

4.4.1 Study Area

Costa Rica's dry North West is a lowland area in Guanacaste that stretches from the Pacific coast in the West to the foothills of the Guanacaste Cordillera in the east: and from the provincial capital of Liberia in the south to the Nicaraguan border in the north (see Appendix 2). It is a seasonally-dry region, experiencing an average of six and a half dry months per year during which water availability is severely restricted (FCGG & MAG, 2007). Its natural vegetation cover is a mix of tropical dry forest and open savannah (Calvo-Alvarado, et al., 2008).[5] The selection of this study area provides an opportunity to examine the processes of forest recovery in a tropical dry ecosystem, which are one of the most threatened but least studied ecosystems in Latin America (Sanchez-Azofeifa, et al., 2005).

The study area crosses two municipalities: La Cruz to the North and Liberia to the South (see also Appendix 2). Specifically, it encompasses the dry, un-irrigated, agricultural areas in western La Cruz and northern Liberia. These two areas are geographically separated by Santa Rosa and Guanacaste National Parks.

Table 4-1 compares basic socioeconomic data for the two municipalities, as socioeconomic data specific to the study area is unavailable. Despite being similar in size, Liberia is more populous and urbanized than La Cruz, and it contains one large urban area, the provincial capital of Guanacaste, Liberia city. Liberia city became the commercial centre for the coastal tourism industry, facilitated by the construction of an international airport nearby in 1997. In contrast, La Cruz has only one, small urban centre, the municipal capital, and has limited involvement in tourism. It also has a lower level of human development than Liberia. Cattle-farming remains the dominant land use in both municipalities. The agricultural area in Liberia is generally flatter and more fertile than in La Cruz, and it is also occupied by fewer and larger-sized properties (see again Table 4-1).

4.4.2 Methodology

The present study used a comparative, qualitative approach to examine forest recovery processes and livelihood change on private properties in five geographic communities in the study area. While comparative research can produce more robust results about patterns in the way large-scale change processes impact livelihoods and forest recovery (Bebbington, 2001; Bebbington & Batterbury, 2001), it can also reveal important differences in those impacts across different geographic locations (Nagendra, 2007; Sloan, 2008; Tucker, et al., 2005; Young, et al., 2006). At the same time, qualitative research is well-suited to revealing what is specific about different contexts and settings, as well as investigating linkages and dynamics in complex cases (Johnson & Onwuegbuzie, 2004; Stake, 1995, p. 37)

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[5] See Appendix 3 for photos of the landscape in the study area.

In addition to the summary below, a detailed description of the research methodology is contained in Chapter 3 and an overview is also provided in Appendix 5. Initially, an in-depth case study was conducted in one community ("Reference Community"). A community was selected in which landholder livelihoods were more negatively impacted by changes associated with globalization than other communities in the area. It was therefore a critical (or extreme) case of livelihood change that presented the best opportunity to generate new knowledge (Yin, 2003, p. 37). One-on-one semi-structured interviews were conducted with 13 current or former landholders and two community leaders. Interviews focused on farming practices, current and historical land-use change, livelihood strategies, local socioeconomic conditions, and experiences with conservation programs. Interviews were transcribed verbatim in Spanish and coded using NVivo software (Gibbs, 2002). Coding focused on identifying patterns in the factors influencing landholders' livelihood strategies and land-use decisions.

Following the in-depth case study, a more streamlined regional study was conducted that involved one-on-one semi-structured interviews with 14 current or former landholders and 4 community leaders from 4 additional communities in the study area ("Comparison Communities"). For these interviews, a contrast-and-compare technique was used to quickly identify similarities and differences in the processes influencing land use decisions compared to the Reference Community. The interviews were summarized and tabulated in English and compared to the results from the Reference Community.

Interviews were also conducted with 12 representatives of relevant government agencies, industry organizations and an environmental organization. The results of these interviews do not form a part of the study results, rather they were used to contextualize and cross-check the results from the Reference and Comparison Communities (see Chapter 3).

Mechanisms employed to protect the study against threats to quality included: seeking out negative cases during data collection (Baxter & Eyles, 1997; Fossey, Harvey, McDermott, & Davidson, 2002); the use of a prior analysis framework to structure data collection and analysis in the Comparison Communities (See Chapter 3); triangulation of data sources (different communities, landholder types, government and industry representatives) (Baxter & Eyles, 1997; Maxwell, 2005, p. 105-16); a peer review of the methodology (see Chapter 3); and consistency of the results with land-use studies conducted in similar regions of Latin America (Baxter & Eyles, 1997; Maxwell, 2005, p. 105-16).

4.5 Results

The key results obtained for each of the five communities are presented in turn below. They include descriptions of the community, the key processes influencing land-use and livelihood decisions, and the implications for forest recovery. As the results from the Reference Community served as a point of departure for examining land-use in the remaining communities, they are presented in more detail. These results include direct, translated quotations from interview texts (in *italics*). The results from the Comparison Communities are presented more briefly. They include paraphrased, translated segments of interviews in place of direct quotations (as bulleted lists in boxes).

Of course, many issues exist over which participants held legitimate but conflicting opinions. An example is landholders' opinions of PES. Where disagreement amongst participants was encountered for topics relevant to this study, the extent of agreement is indicated in the results with phrases such as "most landholders…" and "respondents had mixed opinions…"

4.5.1 Reference Community

Description

The Reference Community ("Ref") is a coastal community of 2-3,000 people located in the municipality of La Cruz (see Table 4-2). It was established in the late 1970s after two large haciendas were expropriated by the Costa Rican government. While most of the hacienda land was set aside to become a part of Santa Rosa National Park, the area around the Reference Community was distributed to former hacienda workers by the Agrarian Development Institute (IDA). IDA is a government agency that distributes land by forming rural settlements called *asentimientos*. Beneficiaries of IDA are known as *parceleros* ("parcel holders"). IDA established an *asentimiento* in the present day Reference Community, distributing about 70 land parcels of 20 hectares each. At the same time that the *asentimiento* was established, people also began to fish commercially. The community rapidly expanded as people arrived from Nicaragua and other parts of Costa Rica to fish, and fishing remains the dominant economic activity today.

Land-use and livelihood change

In the past, *parceleros* primarily used land for cattle-farming as well as subsistence agriculture:

> *"[In the past] we were in a lovely environment... of farming. There were farmers, there were many farms. There was cattle, milk, cheese, whatever you wanted. There were pigs, everything, everything you needed was there to get. You could produce. People sowed corn, beans, rice, everything, bananas, everything was there."* (Ref-1, labourer)

Today, some *parceleros* continue to farm their land using the same basic methods as in the past, such as burning old pasture at the end of summer to promote new growth. However, recently others have abandoned land or sold it to investors. This has instigated a decline in cattle-farming and subsistence agriculture in recent years:

> *"Some people have parcels just to have them. They don't even have fences. Nothing more than "this is mine"....: to see who will buy them tomorrow."* (Ref-14, labourer)

Respondents provided four key reasons for this decline in cattle-farming and subsistence agriculture. First, they indicated that the climate was drier today than in the past, which has made it more difficult to support a family on the resources of a small land parcel:

> *"Because it doesn't rain, things with cattle-farming aren't good. If it doesn't rain they die ... in the past [cattle farming] was better. It rained more. There was more pasture."* (Ref-3, *parcelero)*
>
> *"The little lot of mine didn't even have 20 hectares, but 19. It was difficult to survive because it didn't produce for me. In spite of having sons that helped me, it didn't give me enough to subsist... There was not enough water and pure rock."* (Ref-8, *parcelero*)

Second, costs of living have risen, making it difficult to raise a family on the resources of a small land parcel:

> *"Look how gas for the car is expensive, yes, and electricity is expensive ... Today there are many good things, but the worst thing is that if you go about looking, you can't get what you could get before."* (Ref-1, labourer)

Third, *parceleros* lacked the economic resources and financial assistance needed to improve their farming methods and increase productivity, and to adapt to the dry climate:

> *"[IDA] gave us technical assistance and improvement for pasture and that reforestation ... Now they don't give help to anyone...for the last ten or some years. There isn't help for anyone like that."* (Ref-8, *parcelero*)
>
> *"To have a lot of cattle in summer you have to have a lot of pasture, and if you don't have pasture you have to have money to buy it and bring it in. So we aren't economically enabled for this."* (Ref-4, community leader)

Finally, over the last five years foreign investors have arrived to buy land, driving up prices. As many *parceleros* were already struggling to subsist on their parcels, this gave them an economic incentive to sell land:

> *"Those who had their 20 hectares, they began to sell them. To take the money, good money, let's say."* (Ref-5, tourism operator)
>
> *"[The parceleros] are dying from the dry, but you keep moving forward. But they have benefited because at least now, tomorrow you can sell for a million dollars if that's the case."* (Ref-3, *parcelero*)

However, respondents also indicated that other *parceleros* were compelled to continue farming despite low productivity because there was no alternative work available in the community:

> *"They have their cattle and they sell cheese at least, and because there isn't work for you to maintain your family any other way."* (Ref-4, community leader)

In general there is a severe lack of employment in the Reference Community, which most respondents believed was due to government actions to protect the environment. The expropriation of the nearby haciendas and creation of the national park in the 1970s put an end to agricultural work, while the recent closure of a nearby marine protected area to fishing activity has severely restricted that industry. At the same time, the government restrictions on timber-cutting have prevented land-clearing for tourism development in the community. Although foreign investors have bought land in anticipation of a future tourism industry developing in the local area, the only tourism project to begin construction was stopped by the Environment Ministry (MINAE) and the municipal government. To date, no development project has succeeded in getting the government permits required to clear land and build. This leaves *parceleros* and their families with few off-farm economic opportunities:

> *"They had to stop [the tourism development] and it is something that the community here, we lost ... we don't have a source of employment."* (Ref- 4, community leader)
>
> *"They come here and say "you can't fish there anymore", but they don't say what people can do... The laws impede tourism."* (Ref-15, businessman)

Implications for forest recovery

Forest has begun to recover in the Reference Community on land that is no longer used for cattle-farming. However, as farming activities began to decline relatively recently, insufficient time has passed for the abandoned land to regenerate significant areas of mature forest:

> *"Of timber, honestly there hasn't been any... new forests have to wait to grow. You have to wait a time for them to grow, to make mountain, to make forest..."* (Ref-7, *parcelero*)[6]
>
> *"Yes [new forests are growing], but they will take a thousand years to grow."* (Ref-14, labourer)

Respondents also indicated that forest recovery was restricted by human-lit fires. The greatest fire threat was felt to come from deer hunters rather than the fires lit by *parceleros* to rejuvenate pasture:

> *"Only the fires, the fires destroy everything ... When fire passes everything is swept away."* (Ref-9, *parcelero*)

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[6] The term "mountain" (*montaña* or *monte* in Spanish) is commonly used by landholders to refer to primary or mature secondary forest as most remnant primary forest is located on unproductive lands in high, steep and undulating areas.

> *"Many [burn] because they know that when there is new sprouting pasture the animals can eat, there are deer. They are hunters and they go out in quantities."* (Ref-10, *parcelero's* adult child)

In addition to the early forest recovery on abandoned parcels, a small amount of forest has also recovered on parcels that are still used for cattle-farming. A few *parceleros* have set aside areas of forest reserve or have planted a few hectares of exotic trees as part of a past reforestation incentive program administered by IDA in the 1990s. However, these areas are small and therefore have little impact on forest cover:

> On my farm I had a few hectares of *pochote* [a timber species]… It was to make the area fresher and to protect the creek that is nearby. The piece of land was too dry for agriculture. (Ref-12, former *parcelero* [paraphrased])

The strongest incentives for *parceleros* to reserve forest were to protect water sources and to restore the healthier, more productive landscape that existed in the past for future generations:

> *"It is good if the environment is forested and it gives everything. As desert, we are never, never going to see production. So, at the moment one, some or other people try to not destroy that because, definitively, for those who come behind."* (Ref-3, *parcelero*)

> *"We want to protect the water because if we don't protect the water it will come to an end. And we don't have the capacity for more water."* (Ref-4, community leader)

On the other hand, government incentive programs for reforesting or conserving forest were not seen to encourage *parceleros* to conserve forest or reforest. In general, respondents did not distinguish between past incentive programs administered by IDA and MAG, and the current PES program. Few *parceleros* had participated in any of these programs. Respondents indicated that payments were too low and inconsistent, and that insufficient technical assistance and support was provided to make participation in these programs desirable:

> *"I was in ... a compensation for managing the forest ... they give you only a little bit, and there wasn't anything in the way of technical assistance, they didn't come here ... It was too difficult, I didn't like it."* (Ref-2, *parcelero*)

> *"They only pay once a year [under PES]. What are you going to eat with only once a year? ... I can't put my parcel into mountain because I have the cows and that's how I live."* (Ref-3, *parcelero*)

In summary, respondents in the Reference Community attributed early forest recovery to the decline of traditional farm activities and the sale of land to investors that do not clear the land for production. They indicated that the reason for this decline was that *parceleros* lack the natural and economic resources needed to continue farming. However, the shortage of off-farm economic opportunities also compelled some *parceleros* to continue farming despite low productivity. At the same time, fire restricted forest recovery and government incentive programs were not considered effective in encouraging forest recovery.

4.5.2 Comparison Communities

4.5.2.1 Community A

Description

Of the Comparison Communities, Community A ("cA") has the most similar land-use conditions compared to the Reference Community (see Table 4-2). It is geographically close to the Reference Community, also located in La Cruz municipality, with a population of 1-2,000 people. Like the Reference Community, it is a coastal community that formed as an IDA *asentimiento,* and fishing is its primary economic activity. The initial *asentimiento* comprised 19 families, but was later enlarged as more people arrived in the locality.

Land-use and livelihood change

As in the Reference Community, *parceleros* in Community A primarily engaged in cattle-farming and subsistence agriculture. In the last 10 years, these activities have also declined and for similar reasons as in the Reference Community. However, the extent of the decline is greater. Today only four *parceleros* still raise cattle. All use the same methods as in the past. In addition, there is almost no subsistence agriculture. Most *parceleros* sold their land to investors or tourism operators, and there are now a small number of hotels and villas established in the local area. As in the Reference Community, the dry climate, and the economic incentive from increasing land prices were key factors influencing this decline. Additional factors were the availability of off-farm work in fishing and tourism, and young people's disinterest in farming (see Box 1).[7]

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[7] In this and all subsequent boxes, "+" and "-" signs indicate positive and negative influences, respectively. Each respondent is referenced with a unique identity code, e.g. "cA-4".

Box 1: Factors influencing the decline of traditional farm activities in Community A

Dry climate/ economic incentive from increasing land prices (+)

- Everyone had land parcels in the past, but then they started leaving and selling them up. What happened is they came here looking for land for agriculture but it isn't good for agriculture because it almost doesn't rain. (cA-4, former *parcelero*)

Availability of off-farm work (+)

- They pay a good price for fish, you can still earn from fishing. In agriculture no, it's too dry (cA-2, former *parcelero*)
- Now things have changed. There is a lot of transport, there are hotels. There is a little work. (cA-1, parceleros)

Young people's disinterest in farming (+)

- The youth aren't interested in the land. They only want land to do business with it, nothing more (cA-4, former *parcelero*)

Implications for forest recovery

Compared to the Reference Community, the land-use change in Community A has led to significantly more forest recovery. The key reason for this is the investors and tourism operators that have bought most of the land have not cleared it on a large scale. This has allowed forest to recover. In addition, the first land sales occurred 5-10 years earlier than in the Reference Community, and so sufficient time has passed for more mature forests to regenerate. Respondents also indicated that fires lit by farmers, households and hunters also restrict forest recovery, although there was some indication that the incidence of fire had decreased in recent years (see Box 2).

Box 2: Factors influencing forest recovery in Community A

Investors/tourism operators do not clear land (+)

- No [they aren't cleaning the pasture]. It's growing underbrush and now this is what people need. This is what they look for, to have mountain. (cA-4, former *parcelero*)

Sufficient time for forest to regenerate (+)

- All these people that have bought land don't clean it. There the mountain is forming itself. This began more or less 4 years ago. Some is ten years old. (cA-1, *parcelero*)

Fire restricts forest recovery (-)

- In the past people were good at lighting fires, but they didn't know what they were doing. Now you don't see it as much. (cA-3, *parcelero*)

4.5.2.2 Community B

Description

Community B ("cB") is the municipal capital of La Cruz and surrounding area (see Table 4-2). It is an inland community of 4-6,000 people and it was established much earlier than the Reference Community. Landholders in this community acquired land through sale or inheritance rather than through IDA's land distribution programs. Some landholders live on their farms while others live in town or further away in the city of Liberia. They are generally better educated and wealthier than the *parceleros* in the Reference Community. The average farm size today is approximately 50-60 hectares, although there are a small number of larger properties owned primarily by foreign companies, including a large timber company to the north.

Land-use and livelihood change

The primary land use in Community B in the past was also cattle-farming. In contrast to the Reference Community, there was also a small amount of commercial agriculture, primarily the sale of surplus beans to the National Producer's Council (CNP), which is a government agency that promotes agricultural markets.

Land use has also changed in recent years, but it is changing in two different ways. The first type of land-use change is the decline of traditional cattle-farming and agriculture, as in the Reference Community. However, the key reasons given by respondents in Community B for this decline were different compared to the Reference Community. The two key reasons were the collapse of regional cattle and agricultural markets and the government's withdrawal of financial and market support for both these industries (see Box 3).

Box 3: Factors influencing the decline of traditional farm activities in Community B

Collapse of regional cattle and agriculture markets (+)

- There are about 40% less cattlemen in the last 10, 20 years. There has been a substantial reduction in the cattle herd because of the crisis in 1980-85. (cB-3, landholder)
- Sometimes there isn't anyone to buy produce. Supermarkets have replaced local stores that bought local produce. (cB-2, landholder)

Government withdrawal of financial/ market support (+)

- The National Producer's Council doesn't buy produce anymore, only private companies. (cB-2, landholder)
- Most people in this zone worked with the banks and the interests increased a lot. So many farmers divided their farms. Others sold the cattle to pay debts. (cB-1, landholder)

The second type of land-use change is new and emerging: it is the introduction of new cattle-farming activities that increase the productivity of small properties. The new activities enable more intensive cattle-farming, for example by enclosing cattle in corrals, growing sugar cane for supplementary feed, and planting improved pasture varieties on the most fertile, water-fed areas. The two key reasons given by respondents for the introduction of these new activities were recent improvements in regional markets, and improved access to financial and technical assistance (see Box 4). Assistance came from partnership projects between the regional office of the Ministry of Agriculture and Livestock (MAG) and industry organizations such as the Guanacaste Cattlemen's Chamber and

CORFOGA, the national body that represents the cattle industry. However, biophysical conditions such as poor soil quality and irregular topography, as well as young people's preferences for off-farm employment also limited both traditional and new-method cattle-farming (see Box 4).

Box 4: Factors influencing the introduction of new farm activities in Community B

Recent improvements in regional markets (+)

- There are others that have returned to having cattle again given that the price is more or less good. (cB- 2, landholder)

Improved access to financial and technical assistance (+)

- CORFOGA has an important credit program. You can get funds to make it through until the animals grow and you can sell them at a better price (cB-3, landholder)

Restrictive biophysical conditions (-)

- In other places there are a lot of tractors, they make hay bales, they make pastures. Everything is easier. Here it is very difficult because the land is undulating. (cB-1, landholder)

Young people prefer off-farm employment (-)

- About 10% of cattlemen's children keep farming. When they grow up they leave. They study. They want to pursue a life that is a little better. (cB-2, landholder)

Implications for forest recovery

Forest has also regenerated on abandoned farm land in Community B (see Box 5). Many properties have small areas of marginal land under reforestation for the purpose of harvesting timber in the future. Respondents also indicated that the shift towards the use of more intensive cattle-farming methods promoted ongoing forest recovery on properties by releasing more land from production for forest reserves and plantations. However, respondents felt that the permit system for tree-cutting was not effective in preventing deforestation. Commercial loggers come to the area to buy timber from landholders. Respondents believed that commercial loggers obtained permits to harvest timber too easily despite harvesting in conditions that are restricted by government regulation, such as near water sources. They also indicated that the PES program was not as effective in promoting forest recovery as it could be because payments were inconsistently made to landholders.

Box 5: Factors influencing forest recovery in Community B

Abandoned farm land (+)

- Many farmers stay without cattle. They let the land go into forest reserve. There is lots of land like this (cB-4, community leader)

Use of more intensive cattle-farming methods (+)

- The vision of the cattleman has changed. He has now worked out that it's better to have the cattle part run in accordance with the environment. So he has a part in reforestation and a part in cattle (cB-2, landholder)

Permit system for tree-cutting is not effective (-)

- MINAE always gives permits to those who buy timber. I don't know by what criteria, but they always give them the permits. (cB-2, landholder)

PES is not effective (-)

- I have a small number of hectares in PES. But it was our turn to be paid months ago and we weren't. We still don't know if we will be paid. (cB-1, landholder)

4.5.2.3 Communities C and D

Description

Land-use history, land-use change and implications for forest recovery in Communities C and D are very similar, and so they are reported together. Community C ("cC") is an inland community of 2-4,000 people located at the base of the Guanacaste Cordillera in Liberia municipality (see Table 4-2). It is also geographically close to the provincial capital, Liberia city. IDA established an *asentimiento* in this community, distributing 20 ha land parcels to some landholders. Other landholders bought or inherited land that was once a part of haciendas but was later divided and sold. While IDA *parceleros* mostly live on their farms, other landholders are more likely to live in town or in nearby Liberia. Most properties are 50-100 hectares in size, but there are also some larger properties owned by Costa Rican and foreign companies.

Community D ("cD") is Liberia city (see Table 4-2). It is included in the study because a number of landholders live in the capital and have properties located in the dry zone to the north and west of the city. These landholders are generally wealthier than those in the other communities. They acquired land through purchase or inheritance. Average property size is also larger than for the other communities, ranging from 100-300 hectares. As in Community B, landholders in both Communities C and D generally have higher levels of education than in the Reference Community.

Land-use and livelihood change

The dominant land use in Communities C and D the past was also cattle-farming. Secondary uses were subsistence agriculture, and sugar cane grown first for local use and later for commercial sale. There have been three types of land-use change in recent years.

The first land-use change is the decline of traditional farm activities, as in the other communities. Respondents largely attributed this to the decline of regional cattle and agricultural markets (see Box 6). However, an additional influential factor was increased access to off-farm employment that drew people away from farming and agricultural work. In particular, the growth of the tourism-related service sector in Liberia opened up new employment opportunities for those who lived within access of the city. Access to higher education to train for service employment further facilitated a shift towards off-farm employment. Untrained labourers also began to work in tourist lodges on the slopes of the Cordillera, and some traveled to the tourist resorts on the Nicoya Peninsula and the Papagayo Gulf to work in construction and hospitality.

Box 6: Factors influencing the decline of traditional farm activities in Communities C and D

Decline of regional cattle/ agricultural markets (+)

- Because of the drop in prices, cattle-farming businesses weren't profitable and people have been getting out of it. (cD-1, landholder)

Increase in off-farm economic opportunities (+)

- There aren't people to work on the farms. It's easier to work in tourism than on the land. (cC-2, former landholder)
- Lots of people here work in Liberia as teachers, in hotels, in the airport, in offices. There are 7 buses a day to Liberia now. (cC-5, community leader)

Access to higher education (+)

- The youth all study. Before there wasn't anywhere to study. Now they are coming out as lawyers, professors, engineers. (cC-2, former landholder)

The second land-use change was the introduction of new, intensive farm activities on some properties, including semi-established cattle-farming and non-traditional agriculture such as sugar cane for the biofuel market, dry rice varieties as well as some fruits and vegetables. Respondents gave four key reasons for the development of new farm activities: recent improvements in agricultural and cattle markets; better access to financial and technical assistance that enabled new farming methods and facilitated technology transfer; relatively good water access; and the changing vision of farmers towards intensive farming (see Box 7). However, landholders also indicated that inadequate government support for emerging markets and intensive farming methods restricted these new activities from developing further.

Box 7: Factors influencing the introduction of new farm activities in Communities C and D

Improved regional markets (+)

- Once agriculture was for food. Now it is for fuels. So sugar cane is now a very good option for this region (cD-2, landholder).

Access to financial/ technical assistance (+)

- There is a project between the Cattlemen's Association, MAG and CORFOGA to give incentives for cattle-farming. There are more people interested in producing. (cC-4, landholder)

Water access (+)

- A group of small producers are initiating a local irrigation project. The water source is very good. (cC-3, landholder)

Intensive farm activities (+)

- They prepare the soil there with machines to sow, but they also protect forest, leave some there. They sow trees, it is quite balanced. (cD-2, landholder)

Lack of government support (-)

- The big hotels import their meat directly from the USA for clients. The market has changed a lot. The government hasn't given the help needed. (cD-1, landholder)

The third land-use change is the increasing development of land for tourism, commerce and residences. This has been stimulated predominantly by the growth of the tourism industry (see Box 8). In Community C, small-scale developers have begun to build holiday homes and residences for people who work in Liberia. Large-scale residential and commercial development occurs on the outskirts of Liberia, and along the highway that extends west towards the international airport and the tourist resorts of the Nicoya Peninsula. An additional factor influencing this land-use change is the preference of cattlemen's adult children to sell or develop land for tourism rather than use it for production.

Box 8: Factors influencing land development in Communities C and D

Growth of tourism industry (+)

- There is a real estate agency in town dedicated to selling land. A developer bought an area and they sell parcels to people who want to have a weekend house in the countryside. (cC-5, community leader)
- Tourism began to increase in Liberia 3-5 years ago. It grew quickly. Some farmers sold land with bad soil to tourism businesses, for example near the airport (cD-2, landholder)

Preferences of adult children to sell or develop (+)

- The transformation of the countryside into recreation and urban zones will continue because the agricultural land owners have already passed the land to their children, and the North Americans have bought land. (cD-2, landholder)

Implications for forest recovery

As in the other communities, forest has recovered on marginal land in Communities C and D that is no longer under production. Respondents indicated that the use of more intensive farm methods today combined with growing environmental awareness amongst landholders encouraged forest recovery (see Box 9). However, they also suggested that forest recovery was threatened by fires, demand for timber for tourism construction, and illegal logging that is not deterred by the permit system. Respondents had mixed opinions about the impact of PES. Some considered it to be an effective incentive for landholders to reforest and conserve forest, while others felt that the payments were too low to encourage these activities.

Box 9: Factors influencing forest recovery in Communities C and D

Use of more intensive farm activities/ growing environmental awareness (+)

- Intensive cattle-farming is very conservationist. (cD-2, landholder)

Fire (-)

- Fire is a problem. Hunters light them to clear underbrush to see deer, and some farmers don't look after fires lit to promote new pasture growth. (cC-4, landholder)

Demand for timber/ illegal logging (-)

- A rise in construction on the coast creates the need for timber. Commercial loggers are aggressive about wanting to buy timber from farmers. They need to promote adequate use of the permits. (cC-4, landholder)

PES (+/-)

- There is no use in PES because they don't pay well. (cC-5, community leader)
- PES is good; it gives people a reason to worry about caring for forest. (cD-2, landholder)

4.5.3 *Summary of results*

Figure 4-3 compares the degree of land-use change that has occurred in the Reference and Comparison Communities, and the associated change in forest cover. In each case, four key elements changed in ways that impacted land-use: traditional farm activities; new, intensive farm activities; off-farm economic activities; and non-productive land uses. In all the communities, land-use changes resulted in a net increase in forest cover to varying degrees. However, differences in the way these four elements changed in each community created different pathways to forest recovery in each case. For example, in the Reference Community, traditional farm activities declined but there was no increase in new, intensive farm activities or off-farm economic opportunities. There was, however, an increase in non-productive land use with the arrival of foreign land investors. This contrast with Communities C and D in which traditional farm activities also declined but new, intensive farm activities and off-farm economic activities both increased strongly. Non-productive land use also increased strongly, with growing residential and tourism development.

4.6 Discussion

4.6.1 Linking forest recovery and livelihoods

4.6.1.1 Pathways to forest recovery and livelihood strategies

The different pathways to forest recovery identified in the study area can be framed in terms of changes in landholder's livelihood strategies. The four elements of change in Figure 4-3 (traditional farm activities; new, intensive farm activities; off-farm economic activities; and non-productive land use) represent different types of livelihood strategies. In each community, landholders partially or fully changed their livelihood strategies from traditional farm activities to one or more of the other three strategy types. In some instances, this was related to a change in the type of landholder. For example, in the Reference Community, the change from traditional farm activities (traditional cattle-farming) to non-productive land use (land investment) was related to land sales by *parceleros* to foreign investors. In each community, net forest recovery, albeit to varying degrees, was an outcome of these changes. However, as the type and degree of livelihood change made was different in each community, so too was the specific pathway to forest recovery. In other words, while the ***outcome*** for forest cover was similar in each community (see Figure 4-3), the ***process*** leading to that outcome was different because of differences in the ways livelihood strategies changed.

Landholder's different access to the five livelihood resources lay at the heart of this process. Differences in landholder's access to each of the five resource types included in the sustainable livelihoods framework are represented diagrammatically in Figure 4-4. The diagrams are not meant to represent an absolute measurement of resource access or to suggest that each resource is equally valuable for landholders' livelihoods. Rather, they show *relative* difference in landholder's access to each resource type based on interview responses. Increasing access is indicated by increasing distance of the shape's edge from the centre point of the diagram along the corresponding axis.

In the study area, landholders in the Reference Community had the fewest livelihood strategies to choose from as they had the least access to the five types of resources (Figure 4-4, top-left). By comparison, landholders in Communities C and D had the most livelihood strategies to choose from because they had much better access to all resource types (Figure 4-4, bottom right). They had greater access to formal education and technical assistance (human resources), as well as better water access, larger farm sizes and flatter, more fertile land (natural resources). They also had access to more financial assistance and greater off-farm economic opportunities (economic resources), better transport and other infrastructure facilities (physical resources) and were actively involved in cattle industry organizations (social resources). Landholders in Communities A and B had better access to some resource types than landholders in the Reference Community but not others. They therefore had more livelihood strategies to choose from than the landholders in the Reference Community, but less than those in Communities C and D.

As indicated in the sustainable livelihoods framework (Figure 4-1), landholder's access to livelihood resources was impacted by changes in ***context***, the mediating effect of ***policies, institutions and processes***, and the resulting changes in ***livelihood*** and ***sustainability outcomes***. The contextual changes in the study area included, but were not restricted to, the large-scale changes identified by Calvo-Alvarado et al. (2008). The decline of cattle and agricultural markets, the impact of tourism on employment and land prices, and the advancement of environmentalism were all indicated by respondents to influence livelihoods. However, additional related processes were also indicated. The growth of the market economy resulted in rising costs of living and farming that increased the amount of income landholder's needed to generate from land or other sources. The lifestyle aspirations of young people also shifted towards a preference for urban living and off-farm employment. Some respondents, particularly in the Reference Community, also indicated that the climate had changed. They reported less rainfall in recent times compared to the past. However, no long-term, local climatic data is available to corroborate this.

Policies, institutions and processes mediated how these large-scale changes impacted livelihood resources. For example, the withdrawal of government assistance for traditional cattle-farming and agriculture after the 1980s reduced access to economic resources (e.g. favourable credit facilities) and human resources (e.g. technical assistance). More recently, growing government support for new, intensive farm activities had increased some landholder's access to the economic and human resources needed to pursue this new type of livelihood strategy. An example was the MAG program to promote semi-established cattle farming. Meanwhile, conservation policies also mediated how the advancement of environmentalism impacted livelihood resources. In the Reference Community, for example, the creation of the national parks, the closure of the marine park to fishing, and restrictions on land clearing decreased landholder's access to both natural resources (land, fish stocks) and economic resources (off-farm employment). In contrast, PES payments provided an alternative source of income for some landholders in Communities C and D and promoted forest protection near water sources, increasing both economic and natural resources. However, most respondents indicated that the influence of PES was relatively small because of low, inconsistent payments and insufficient technical assistance.

In turn, the livelihood and sustainability outcomes of changed livelihood strategies also impacted access to resources. This was most evident in Communities C and D. In these communities landholders had greater access to income generated through off-farm economic activities. This income could then be invested in new farm activities (e.g. building corrals, planting sugar cane and improved pasture species), to purchase land, and in some cases to develop non-productive land uses (e.g. tourism ventures).

4.6.1.2 *Cross-scale interactions impacting livelihood resources*

Importantly, the relationship between large-scale changes; institutions, policies and processes; and access to livelihood resources was different in the study area to that proposed by the sustainable livelihoods framework (Figure 4-1). In particular, the framework overlooks important cross-scale interactions because it does not explicitly consider the influence of locally-specific factors. Local factors that affect livelihood resources are not considered separately from the resources themselves but included as components of resources. For example, local differences in soil fertility and water access are represented as differences in natural resource availability. However, by not considering the influence of local factors separately, the framework overlooks how large-scale processes knit-together with local factors to impact livelihood resources in different ways. Further, it overlooks the way that local factors also affected the way institutions, policies and processes mediated large-scale changes.

In the present study, the impact of large-scale change processes on landholder's livelihoods cannot be understood without directly considering local factors. An example is the impact of differences in geographic location on off-farm economic opportunities. In the Reference Community and Community A, proximity to beaches that are desired by foreign investors increased the opportunity to sell land at reasonably high prices. However, distance from the main urban centre of Liberia restricted access to off-farm employment in the service industry. Even though Community B is only 10-20 kilometers from the coastal communities, its inland location meant landholders did not have the option of selling land to foreign investors. In Communities C and D, proximity to Liberia significantly increased people's access to off-farm employment in the service industry, as well as access to education facilities and the opportunity to sell land to developers. These examples show that even small differences in locally-specific factors like geographic location can significantly impact the way large-scale processes, in this case the expansion of tourism, change people's access to livelihood resources.

Similarly, the impact of institutions, policies and processes was also influenced significantly by local factors. For example, landholder's participation in industry organizations promoted their participation in government agricultural programs aimed at introducing new, intensive farm activities. The landholders in Communities B, C and D that were actively involved with industry organizations participated in MAG programs to introduce semi-established cattle-farming. Landholders in the Reference Community and Community A did not participate in either industry organizations or government programs. This may be related to their generally lower education levels or their position as beneficiaries of IDA. In the past, IDA was responsible for providing extension services to its beneficiaries rather than MAG. However, this role has declined, leaving landholders in *asentimientos* without their traditional source of financial and technical assistance.[8]

The situation in the study area reflects many of the processes that are identified as key characteristics of rural livelihood change in the context of globalization (Bebbington, 2004; Escobar, 2001; Woods, 2007; Zimmerer, 2006; Zimmerer & Bassett, 2003). Forest recovery in the study area was an outcome of the knitting-together of large-scale change processes and locally-specific factors - mediated by institutions, policies and processes - that is highlighted in this research field. Multiple pathways to forest recovery emerged because of the diversification of livelihoods amongst landholders. This diversification included the increased importance of off-farm, non-agricultural employment that is also recognized as a key characteristic of changing rural livelihoods under globalization (Bebbington, 2004; Kay, 2004; A. Steward, 2007). In this context, the relative value of the different types of livelihood resources shifts (Bebbington, 2004; Kay, 2004). In the study area, access to economic and human resources such as knowledge, technology and capital became increasingly more important to landholders compared to natural resources such as land (see also Kay, 2004).

The situation in the study area also reflected the unevenness in people's ability to adapt to changing conditions that is another key characteristic of changing rural livelihoods in the context of globalization (Bebbington, 2004). Those landholders in the study area that had better access to a wider range of livelihood resources, for example in Communities C and D, were better placed to adapt to the changes by altering their livelihood strategies. Others, such as the *parceleros* in the Reference Community, were more vulnerable to negative impacts from the changes. This was due to their limited access to livelihood resources that restricted their capacity to adapt and take advantage of the changing livelihood opportunities. This unevenness has been shown in political ecology studies to cause increased economic inequality and social polarization in rural areas (Keeling, 2004; Woods, 2007).

4.6.2 Sustainability and management implications

These results have four key implications for the sustainability and management of forest recovery processes.

First, programs aimed at promoting forest recovery should not be designed to address only large-scale changes processes. This is in contrast to the recommendations of some other authors (Grau & Aide, 2008; Wright & Muller-Landau, 2006). Related to this, generalized theories like FTT are inadequate for guiding the management of forest recovery processes on their own. Forest recovery is not only impacted by the large-scale conditions and processes that are common to many rural places: it is also impacted by smaller-scale factors that are specific to different rural places. Forest recovery in Costa Rica's dry North West reflected some of the large-scale processes identified by the generalized theory of FTT, as well as additional large-scale processes associated with globalization. However, the different pathways to forest recovery identified in each of the communities also reflected the important influence of locally-specific factors.

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[8] More recently, there is some indication that IDA's financial and technical assistance to its beneficiaries may increase again in the future under the Costa Rican government's National Food Plan (see http://www.ida.go.cr/index2.html).

Similarly, the management of forest recovery processes is also impacted by locally-specific factors (see also Chowdhury, 2007; Hecht & Saatchi, 2007). This is particularly the case for programs such as PES that aim to influence land-use decision-making at the property level. For example, in the study area wealthier landholders with larger properties were more likely to view participation in PES favourably despite its perceived problems while smaller, poorer landholders were more likely to reject it outright. Zbinden and Lee (2005) identified similar patterns in landholder's participation in PES in a Costa Rica wide study.

Second, promoting sustainability through forest recovery on private property requires policies and programs that not only facilitate forest recovery processes but also landholder access to livelihood resources. While it is already recognized that not all forest recovery has positive impacts on environmentally sustainability (Barlow, et al., 2007; Farley, 2007; Gardner, et al., 2007), this study shows that the same is true for social sustainability. As Bray and Klepeis (2005) stated in the context of Mexico: "What may be good for forest cover may not be good for people" (p.g. 208). In Costa Rica's dry North West, the livelihoods of some landholders were restricted by conservation programs aimed at protecting forests and promoting forest recovery, most notably in the Reference Community. These findings add to those from empirical studies of forest transitions in other Latin American locations that show the processes driving forest recovery can impoverish rural populations (Baptista, 2008; Hecht & Saatchi, 2007; Kull, et al., 2007).

Further to this, the impact of policies and programs aimed at facilitating forest recovery on social sustainability can also vary greatly amongst different social groups within the same area. In Costa Rica's dry North West, multiple pathways to forest recovery reflected the varying capacity of landholders to adapt to changing conditions with new livelihood strategies. This shows that, as is highlighted by the research on rural livelihoods under globalization, differences in locally-specific factors can cause significant differences in people's ability to take advantage of changing conditions under globalization (Keeling, 2004; C. Steward, 2007; Woods, 2007). Therefore, managers must recognize that some social groups will be more vulnerable to negative impacts from forest recovery processes than others. This suggests that the impact of policies and programs on these groups warrants particular attention in order to avoid unacceptable costs in social sustainability.

Third, managers need to be cognizant of emerging new threats to recovering forests that may require different management and conservation approaches in the future. The present study showed that new, secondary forests may not be safe from future threats. In other words, the forest transition in Guanacaste, at least in parts of the province, may be reversible under certain conditions. Respondents indicated that a number of threats existed to regenerating forests in the study area, including human-lit fire, tourism and residential development, and illegal logging encouraged by the timber needs of tourism-related construction. This supports the findings of Calvo-Alvarado et al. (2008) that emerging pathways of forest-cover change in Guanacaste have the potential to threaten new forests, despite the existing conservation programs that are in place.

Fourth, sustainability and forest recovery will benefit from greater integration between forest conservation and agricultural programs. This echoes calls made by Harvey, Chazdon and others (Chazdon, et al., 2009; Harvey, et al., 2008), for an "integrated landscape approach" to the research and management of human-modified landscapes. In the present study, a number of respondents indicated that the introduction of semi-established cattle-farming techniques opened up new opportunities to put parts of cattle-farming properties into forest protection or reforestation. However, forest conservation programs, in particular, PES, are not integrated in any way with the MAG programs supporting these new, intensive farm activities. This indicates that an opportunity to promote forest recovery as a part of mixed land-use on working cattle-farms is being missed.

4.7 Conclusions

In Costa Rica's dry North West, forest recovery on private properties followed multiple pathways that resulted from differences in landholder's access to livelihood resources. These differences were due to the way that large-scale change associated with economic modernization and globalization knitted together with locally-specific factors such as geographic differences. This meant that landholders' abilities to adapt to and benefit from the changing opportunities under globalization were uneven.

By examining forest recovery processes and changes in landholder livelihoods together, the present study contributes to both theories of forest transition and rural livelihoods. It fills in the gaps in our knowledge of how globalization and locally-specific factors influence forest transitions in Latin America that are overlooked by Forest Transition Theory. It also provides a way to increase the engagement between research on rural livelihoods and globalization.

There are four key sustainability and management implications arising from this work. *First*, forest recovery policies and programs cannot be designed to address only large-scale processes. *Second*, pursuing sustainability requires policies and programs that facilitate landholder access to livelihood resources as well as forest recovery. *Third*, new threats to forest recovery may require different management and conservation approaches. *Fourth*, sustainability and forest recovery will benefit from greater integration between forest conservation and agricultural programs.

4.8 Tables and Figures

4.8.1 Tables

Table 4-1: Comparison of selected statistics for Liberia and La Cruz municipalities

	Liberia	**La Cruz**
Area (km^2)	1,436.5	1,383.9
*Population in 2000**	46,703	16,505
*% Workforce in agricultural sector in 2000**	14.57%	47.6%
2007 Human development index (rank out of 81 municipalities)[†]	48	71
No. farms in 2000[‡]	294	470
Average farm size in 2000 (ha) [‡]	144.8	46.2

Sources: * INEC, 2000; [†] MIDEPLAN, 2007; [‡] CORFOGA, n.d.

Table 4-2: Comparison of communities included in the study

	Reference Community (Ref)	Comparison Communities			
		cA	cB	cC	cD
Municipality	La Cruz	La Cruz	La Cruz	Liberia	Liberia
Population (approx.)	2-3,000	1-2,000	4-6,000	2-3,000	80-90,000
Geographic position	Coastal	Coastal	Inland	Inland	Inland
Primary method of land acquisition	*Asentimiento*	*Asentimiento*	Purchase/ inheritance	Purchase/ inheritance, *asentimiento*	Purchase/ inheritance
Average property size (approx.)	20 ha	20 ha	50 ha	80 ha	150 ha

4.8.2 *Figures*

Figure 4-1: The sustainable livelihoods framework

(Adapted from DFID, 1999; Scoones, 1998, 2009)

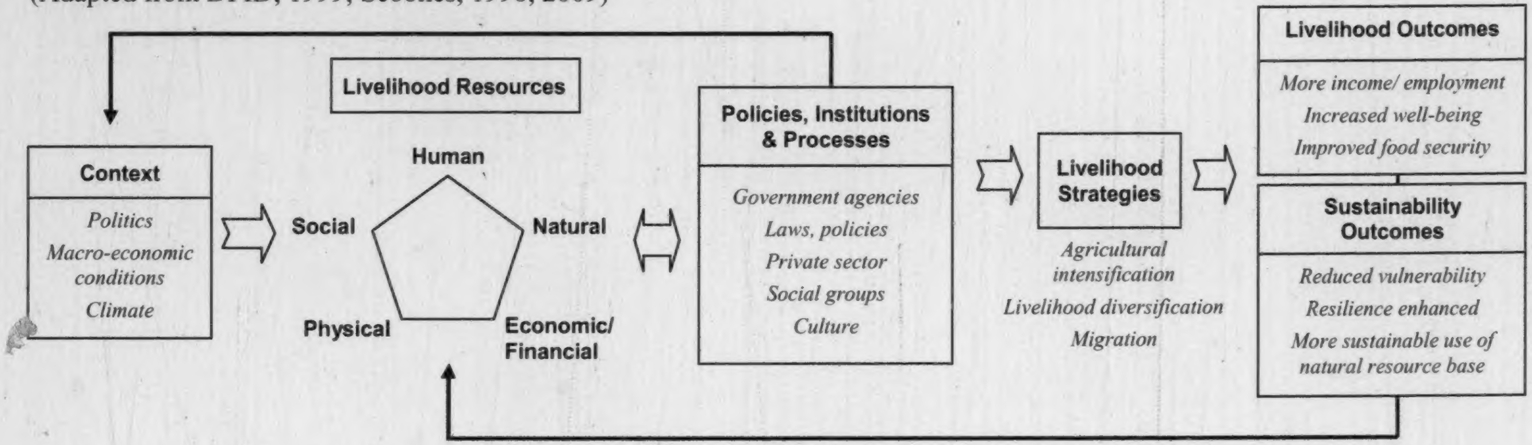
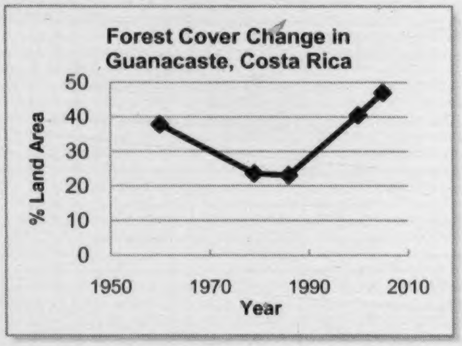

Context
Politics
Macro-economic conditions
Climate
Livelihood Resources
Human
Social
Natural
Physical
Economic/ Financial
Policies, Institutions & Processes
Government agencies
Laws, policies
Private sector
Social groups
Culture
Livelihood Strategies
Agricultural intensification
Livelihood diversification
Migration
Livelihood Outcomes
More income/ employment
Increased well-being
Improved food security
Sustainability Outcomes
Reduced vulnerability
Resilience enhanced
More sustainable use of natural resource base

Figure 4-2: Forest-cover change in Guanacaste, Costa Rica as a percentage of total land area, 1960-2005

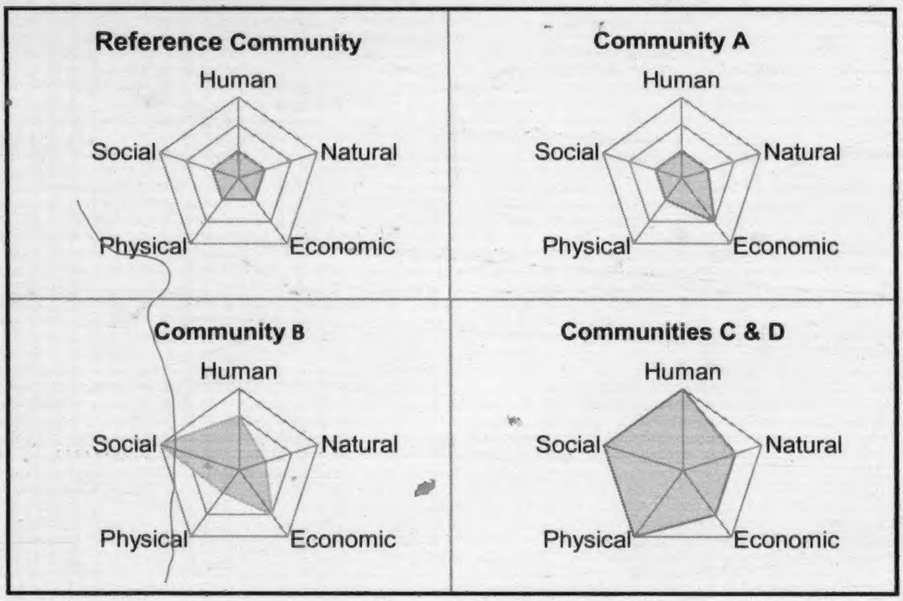


(Source: Calvo-Alvarado, et al., 2008)

Figure 4-3: Comparison of pathways to forest recovery in the studied communities, indicating direction of change in key change elements

	Ref	**cA**	**cB**	**cC, cD**
Degree of land-use change:	Medium	High	Medium	High
Elements of change:				
Traditional farm activities	Declined	Declined	Declined	Declined
New, intensive farm activities	None	None	Increased (*mild*)	Increased (*strong*)
Off-farm economic activities	Declined	Increased (*mild*)	No change	Increased (*strong*)
Non-productive land use	Increased (*mild*)	Increased (*strong*)	No change	Increased (*strong*)
Forest cover change:	Increased	Increased	Increased	Increased

Figure 4-4: Comparison of landholder's access to livelihood resources in the reference and comparison communities



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5 Conclusion

> *Things should be made as simple as possible but not any simpler.*
> *- Albert Einstein*

5.1 Introduction

This dissertation examined the complex and multi-faceted interactions between sustainability, social-ecological systems and globalization. These three concepts, and the interactions and linkages between them, encapsulate the complexity of human-environment interactions in today's increasingly interconnected and human-dominated world. The concept of sustainability highlights the interdependence of human activities and the environment, and the realization that human activities must be altered in some way in order to balance between human action and environmental health into the future. The concept of social-ecological systems encapsulates the intricate, diverse and dynamic relationships that link humans and their environments in complex systems and determine their sustainability. The concept of globalization emphasizes how these relationships are becoming increasingly intense, frequent, and larger in scope.

The research presented in this dissertation examined different but interrelated aspects of the interactions between sustainability, social-ecological systems and globalization. *Chapter 2* examined how globalization processes can advance the pursuit of sustainability by facilitating the transfer of innovative environmental policy between political systems. *Chapter 3* evaluated a novel way for qualitative research to better support natural resource managers to understand complex social-ecological systems and manage them sustainably. *Chapter 4* showed how globalization processes interact with locally-specific factors to influence the sustainability of social-ecological systems in multiple ways.

5.2 Contributions

5.2.1 Theoretical contributions

The research project presented in this dissertation makes two main contributions to theorizing about globalization, sustainability and social-ecological systems. First, it counters the persistent tendency towards single, blue print approaches to solving sustainability problems. Second, it bridges a gap between the generalized Forest Transition Theory and geographic perspectives on globalization by using livelihoods research.

The tendency for the use of single, blue-print approaches to solve a range of sustainability problems is increasingly criticized (Adger, Benjaminsen, Brown, & Svarstad, 2001; Berkes, 2007; Ostrom, Janssen, & Anderies, 2007; VanWey, Ostrom, & Meretsky, 2005). Using the terminology of Elinor Ostrom and others (Ostrom, 2007; Ostrom, et al., 2007), blueprint approaches are panaceas: universal remedies applied to a multitude of problems. Blue print approaches to sustainability problems are particularly common amongst international development and conservation organizations, which often promote a single preferred solution to environmental problems around the globe. In the 1970s, the most common of these was the creation of national parks to protect biodiversity (Berkes, 2007). National parks were later found to be inappropriate for the contexts of many developing countries where local populations relied on natural resources for their livelihoods (Brandon, Redford, Sanderson, & Nature Conservancy (U.S.), 1998). Today, the blanket promotion of market-based conservation mechanisms for use in developing countries is a current blueprint approach (Pagiola, Landell-Mills, & Bishop, 2002). However, market-based conservation mechanisms are also producing mixed results for sustainability in different contexts (Greenspan Bell, 2003; Greenspan Bell & Russell, 2002; Landell-Mills & Porras, 2002).

Globalization facilitates the persistence of blueprint approaches (Adger, et al., 2001). The emergence of global discourses advanced by international development and conservation organizations promotes a shared vision of the nature of sustainability problems and solutions. Further, national environmental policies have converged as governments increasingly follow the lead of those countries deemed to be environmental innovators and pioneers (Busch & Jorgens, 2005; Jänicke, 2005).

Chapter 2 critically examined how one blue print approach was successfully adopted in Costa Rica. Using the lens of policy transfer analysis (Dolowitz & Marsh, 2000; Evans, 2004), it investigated the policy-making process that culminated in the successful implementation of a market-based conservation mechanism in Costa Rica: payments for environmental services (PES). It showed that the transfer of PES policy to Costa Rica was successful only because the conditions needed to support it were already in place in the country. Some of these conditions were the result of Costa Rica's particular political and economic history, while others were built up incrementally through on-going engagement of Costa Rican policy actors with transnational environmental networks. *Chapter 2* therefore shows that Costa Rica's success with implementing PES policy cannot be taken as evidence of the suitability of market-based conservation mechanisms for the different sets of conditions that exist in other developing countries. It therefore warns against seeing Costa Rica's experiences as evidence of the suitability of this blue print approach in other contexts.

The second major theoretical contribution of this research project is to fill gaps in Forest Transition Theory (FTT) and livelihoods research by linking forest recovery processes and changes in rural livelihoods. (Mather & Needle, 1998). FTT is a generalized theory of forest recovery that focuses on large-scale change processes (Perz, 2007; Walker, 2008). It therefore focuses on the variables and conditions influencing forest recovery that are shared between particular cases. *Chapter 4* showed how large-scale processes that are associated with economic modernization and globalization are intertwined with locally-specific factors to alter social sustainability (rural livelihoods) and environmental sustainability (forest recovery) in multiple ways. It revealed that the simplified explanation for forest recovery proposed by Forest Transition Theory overlooks the important influence of locally-specific factors. In Costa Rica's dry North West, forest recovery occurred along multiple pathways, depending on landholder's access to different type of livelihood resources. Changing access to livelihood resources was the result of interactions between large-scale and locally-specific factors. This research therefore showed that forest recovery occurring under globalization is also a process of negotiation between global and local processes (Bebbington & Batterbury, 2001; Escobar, 2001; Woods, 2007), and that the new landscape that is an outcome of this process cannot be adequately understood by reference only to what is shared between different cases of forest recovery.

5.2.2 Methodological contributions

The research presented in this dissertation, specifically Chapter 3, takes steps towards answering the call for new approaches to scientific research that can support society to address increasingly complex problems of sustainability in a globalized world (Lubchenco, 1998). It does this by making two methodological contributions.

First, *Chapter 3* trialed a novel methodology for conducting qualitative research that can support natural resource managers while also maintaining a high degree of scientific credibility. Oriented Qualitative Case Study aimed to make a more even balance to be struck between manager's needs and the requirements for doing good quality research than standard qualitative approaches. The results of the trial indicated that such a balance is indeed possible. Oriented Qualitative Case Study was able to provide a holistic picture of the social factors influencing land-use change. It better matched management timelines and scales than if it had used standard qualitative methods, and it reduced the quality trade-offs caused by streamlining the research process to meet managers' needs. However, as in all research, Oriented Qualitative Case Study made trade-offs between the three different elements of quality: credibility, salience and legitimacy (Cash, et al., 2002; Cash, et al., 2003). It placed a higher priority on salience (policy and management relevance) than basic research, and accepted a lesser degree of credibility (trustworthiness). Importantly, this does not negate the requirement to maintain a high degree of credibility at the same time.

Second, *Chapter 3* also revealed that researchers can creatively use the flexibility of qualitative research to design studies to fit managers' information needs while maintaining scientific credibility. In particular, it showed that researchers can make strategic use of the flexibility available in selecting quality measures. As qualitative research does not rely on a single quality measure or a rigid set of established measures (Baxter & Eyles, 1997; Rolfe, 2006; Whittemore, Chase, & Mandle, 2001), researchers are able to avoid more time-consuming measures and offset the loss of quality by selecting alternative, timelier measures. In this way, the potential of qualitative research to support natural resource managers can be more fully realized.

5.2.3 Substantive contributions

The major substantive contributions of this research project are in the fields of environmental policy-making (Chapter 2), and forest management (Chapter 4).

Chapter 2 highlighted the way that globalization has increased both opportunities and challenges for pursuing sustainability through environmental policy-making. Opportunities for policy innovation are increased by the flow of ideas and knowledge in transnational policy networks. However, challenges are also increased through the facilitation of single policy solutions that are not necessarily suitable to the conditions that exist in different contexts.

This chapter revealed three areas of focus for national policy-makers and international development and conservation agencies wishing to facilitate environmental policy innovation through policy transfer. First, greater engagement between domestic and international actors in transnational policy networks can facilitate a flow of ideas and information between political systems to stimulate innovation. Second, it is important for transferred policies to fit the particular institutional arrangements in the recipient country. Where the institutional arrangements needed for a transferred policy do not already exist, a good fit is obtained by incremental co-evolution of policies along with new institutional arrangements to support them. This means that the transfer of policies from other political systems should not be undertaken too quickly for the institutional arrangements required to evolve. Third, structural conditions beyond the environmental policy arena that support environmental innovation are also important for enabling policy transfer. Policy transfer inevitably requires some changes to be made to the existing policy arena in order to implement the new policy successfully. Structural conditions that support environmental policy innovation enable these changes to be made. Consequently, policy makers and international agencies would do well to focus greater attention on the broader conditions for innovative environmental policy.

Chapter 4 makes four recommendations for forest management focused on promoting forest recovery. First, programs should not be designed to address only large-scale processes driving forest recovery, as locally-specific factors will also impact their performance. Second, promoting sustainability requires programs that not only facilitate forest recovery processes but also landholder access to livelihood resources. Where forest recovery is promoted through processes that also restrict people's livelihood options, it may damage the long-term sustainability of the overall social-ecological system, despite short- to medium-term gains in forest cover. Third, managers need to be cognizant of emerging new threats to recovered forests that may require different management and conservation approaches. Fourth, sustainability and forest recovery will benefit from greater integration between forest conservation and agricultural programs.

5.3 Study limitations

As in all research, the research project presented in this dissertation has limitations. Four key limitations were identified.

First, the robustness of the policy analysis reported in this Chapter was restricted by a lack of access to environmental policy-makers. Authors in the field of policy transfer analysis recognize that direct access to policy-makers supports more detailed examination of the processes of policy transfer (Lana & Evans, 2004). This is particularly the case when trying to determine the degree to which policy transfer was coercive or voluntary. In the present research, the researcher did not have direct access to policy-makers, and so she was required to rely on second-hand accounts of policy-making processes to conduct the analysis. However, this was partly offset by the existence of a large body of research on Costa Rica's environmental policy-making, some of which was written by authors that did have direct access to policy-makers.

Second, the trialled methodology, Oriented Qualitative Case Study, had three specific limitations outlined in *Chapter 3*. First, restricted engagement between the researcher and natural resource managers in the study area limited the opportunity to share research findings. Second, the use of a streamlined research process to increase the timeliness and scale of analysis of the research required that a lesser degree of credibility was accepted in order to increase the salience (relevance) of findings to manager's information needs in this way (Objective 3). This type of trade-off is supported by pragmatic research approaches (Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998; Whittemore, et al., 2001), and within recent literature on the different elements of quality in sustainability research (Cash, et al., 2002; Cash, et al., 2003). However, not all researchers in the scientific community accept such a trade-off, and it therefore leaves the project open to criticisms of lowered research quality. Third, the study area did not completely match the regional management area, the Guanacaste Conservation Area, because more time was required to familiarise the researcher with the study area than expected, which reduced the time available in the field for data collection.

Third, the research project did not draw strongly on natural sciences, and so did not fully embrace the full range of interactions between human and environment systems that influence the sustainability of social-ecological systems. A closer examination of the linkages between forest cover dynamics and land use decisions in Costa Rica's dry North West could have been made with greater use of geographic information technology. Methods such as community mapping and participant interpretation of aerial photography or remote sensing images enable a more geographically-explicit examination of linkages between land-use decision-making and land-cover change (see for example Castella, Trung, & Boissau, 2005; Moran & Brondízio, 1998). This was not included in the present study because of time and logistical constraints, and it therefore limited the examination of some important human-environment interactions.

Fourth, the qualitative approach chosen for this dissertation restricts its palatability to the people it seeks to support. An important rationale for this research is to support policy-makers and managers to address sustainability. However, many policy-makers and managers working in fields that involve human-environment interaction are more familiar with, or trained in, quantitative research approaches (Bryant & Wilson, 1998; Szaro, et al., 1998). This can make them less open to studies that use a qualitative approach. However, the importance of "un-measurable" aspects of human-environment interactions, and the value of qualitative research in this area are increasingly recognized (Bergsma, 2000).

A final point regarding study limitations concerns the generalizability of case study research. Case study research is not well-suited to producing findings that can be generalized to other situations, which is often considered a limitation of this research design (Flyvbjerg, 2006). In the context of the present research, however, limited generalizability is not considered a limitation. The reason is that a main theoretical contribution of this research, as outlined above, is to fill-in the details of forest recovery processes that are overlooked by the generalized theory of FTT. It reveals the important influence of contextual variables: the very components of the case that are *not* generalizable to other contexts. In this context, the intrinsic nature of the research project is a strength of the research design rather than a limitation.

5.4 Future directions

The contributions and limitations of the research project outlined above indicate a number of ways to build on this research in the future. Future research directions cover the three areas of theory, methodology and substantive findings.

Theoretically, further research could develop and test more place-based, context-dependent theories of forest recovery. The results of *Chapter 4* suggest that theories of forest recovery need to engage further with geographic perspectives on globalization. One promising way to advance this research direction would be to engage with existing work on systems-based, multi-scale theories and frameworks of change in social-ecological systems. Examples are hierarchy theory (Perz, 2007), panarchy (Gunderson & Holling, 2002) and Elinor Ostrom's social-ecological framework (Ostrom, 2007). Forest recovery processes are a particular subset of interlinked interactions within changing social-ecological systems. Use of multi-scale theories and frameworks may be able to position forest recovery processes within the context of complex social-ecological systems in a way that allows for analytic understanding without overlooking the importance of contextual variables and multi-scale interactions.

Methodologically, the trial of Oriented Qualitative Case Study could be expanded in three different ways. First, it could be applied to different settings to test its utility in different contexts, and also to examine its use as a comparative research methodology. Second, it could be tested as a tool for monitoring the impact of conservation policies and programs on land-use decisions in one location over time. In particular, it has the potential to be used as a monitoring tool in highly dynamic contexts where the pace of change is too rapid to be examined fruitfully using more in-depth, time-consuming methods. Third, a more robust examination of the limitations of the methodology could be conducted. This would involve a study designed to compare the findings of Oriented Qualitative Case Study to those of a more in-depth, multiple case study conducted in the same study area at the same time.

Substantively, the investigation of the social drivers of forest recovery in Costa Rica's dry North West could be strengthened and deepened by building on the current work using complementary research methods. For example, the work could be expanded into a longitudinal study to examine the dynamics of forest recovery over time. As indicated under the study limitations, further studies could also be conducted to more directly link land-use decisions to land-cover change with the use of techniques such as community mapping, or participant interpretation of aerial photography or remote sensing images. Alternatively, the scope of the present study could be expanded through the use of a survey of landholders' land uses that was designed based on the findings of the present study. Each of these research directions could expand our knowledge of the processes driving forest recovery in Costa Rica's dry North West, and the impact of conservation programs like PES. The contributions of this future work to management could be further enhanced by greater on-going engagement between researchers and the regional natural resource managers in the study area.

5.5 Recommendations for the pursuit of sustainability under globalization

Collectively, the research presented in this dissertation points to four key recommendations for the pursuit of sustainability under globalization, and I would like to conclude this dissertation with these calls to action. The recommendations are intended for the many policy makers in national government agencies and international conservation and development organizations who directly aim to promote sustainability through environmental policy-making and land-use management.

Recommendation 1: Build policy solutions from the bottom-up, not the top-down

Policy solutions must be built from the bottom-up rather than from the top-down. Top-down strategies do not have room for a case-by-case assessment of policy needs and capabilities. They are therefore unable to confront the complex and dynamic nature of sustainability challenges. In contrast, a bottom-up approach opens the door to developing policy solutions that are appropriate for the specific conditions that exist in different places at different times.

The present analysis of environmental policy-making in Costa Rica strongly supports a shift from top-down to bottom-up strategies. A tendency exists amongst policy makers, particularly those involved with international conservation and development organizations, to view Costa Rica's Payments for Environmental Services (PES) policy as a model to be imitated in other countries. However, this approach is misguided. Costa Rica is remarkable for its uniqueness, both within the Central American region and within the developing world more broadly. It has political, social, economic, human, and natural resources that are not representative of other developing countries. Importantly, Costa Rica's successes with environmental policy were possible precisely because of its unique qualities. Consequently, Costa Rica's PES policy should not be a basis for developing top-down strategies for use in other countries where different conditions will not support the same successes.

Importantly, moving to a bottom-up approach will require policy makers to consider a portfolio of possible policy solutions rather than rely on a single, preferred solution. Such an approach would involve finding, enabling, and implementing the right tools for the particular "job" at hand. It would require both policy makers and researchers to focus more attention on developing tools to identify which policy solutions are most appropriate in different cases. This seriously challenges the current approaches of many international conservation and development organizations that tend to promote the use of one type of policy in multiple countries. Currently, the solution preferred by many major development and conservation organizations is market-based mechanisms, including PES. Arguably, this is because these organizations are guided by their neoliberal ideologies, and because they wish to reduce their considerable administrative complexities by adopting simplified strategies. However, these organizations must shift their approaches away from seeking simplified, catch-all solutions to confronting the inevitable challenges of more complex and multifaceted solutions. To do this, they will need to consider that market-based mechanisms may not necessarily be the most appropriate policy solution in all cases.

Recommendation 2: Shift some of the focus away from pursuing policy implementation towards enabling innovative policy-making

Policy makers also need to shift some of their focus away from pursing policy implementation towards enabling innovative policy-making. The distinction between the policy-making process and the implementation process is an important one. Currently, most policy makers in international development and conservation organizations, and many researchers, focus their attention and efforts narrowly on getting specific policies into practice. This may be because at the implementation level they have more control over outcomes and can therefore more easily measure progress and justify their efforts. However, while policy implementation is obviously a crucial component of pursuing sustainability, such a narrow focus seriously limits the sustainability outcomes that are achievable. As the example of Costa Rica shows, the policy-making process that precedes implementation is critically important for capacity-building. It is necessary to build the regulatory and institutional frameworks to support new policy solutions, develop crucial transnational and domestic policy networks, and train policy makers and managers. Without this important process of capacity-building, the foundations needed for specific policies to function well in practice will not exist.

In order to enable capacity-building, policy makers must direct more effort towards developing broad structural conditions to support innovation. In Costa Rica, three key sets of structural conditions were critical for enabling innovative environmental policy-making. *First*, the development of a semi-industrialized economy took pressure off land as an economic resource and provided an economic incentive for environmental conservation. *Second*, a stable political system encouraged international confidence in environmental institutions, opened access to international funding, and provided a space for the resolution of environmental conflicts. *Third,* a strong academic-scientific sector that was linked to policy networks trained environmental managers, raised awareness of environmental problems, and provided direction on appropriate solutions. These conditions closely align with the characteristics shared amongst environmentally-pioneering countries in the developed world that were identified by Jänicke (1992, 2005). However, similar conditions are not commonly found in developing countries. In order to support developing countries to pursue sustainability more effectively, international development and conservation organizations need to move away from a narrow focus on policy implementation to direct greater effort towards enabling the structural conditions for innovative policy-making. To do this, however, they will need to accept the lesser degree of control they will have over specific outcomes at this broader level.

Recommendation 3: Pursue integrated landscape management

Greater sustainability outcomes are more likely to be achieved via integrated landscape management than through more narrow, sectorial approaches. In today's interconnected world, few sustainability problems can be adequately addressed without considering interactions between different components of social-ecological systems. In the case of Costa Rica's dry North West, processes driving forest recovery were also restricting rural people's access to important livelihood resources. This highlights the trade-offs that inevitably arise when pursuing the sustainability of social-ecological systems. In such complex systems, what is good for one part of the system is not always good for another (Walker, Holling, Carpenter, & Kinzig, 2004). In the context of forest recovery, "what may be good for forest cover may not be good for people" (Bray & Klepeis, 2005, p.208). In Costa Rica's dry North West, forest recovery cannot contribute enduringly to the overall sustainability of the social-ecological system if it is narrowly pursued via pathways that also significantly decrease social sustainability at the same time. Rather, sustainability is better served by adopting an integrated landscape management approach that includes programs to promote forest recovery ***and*** programs to support rural livelihoods.

Possible methods for pursuing integrated landscape management are indicated by authors such as Harvey, Chazdon and others (Chazdon, et al., 2009; Harvey, et al., 2008). They involve prioritizing actions; mitigating threats; conserving remnant natural habitat; sustainably managing tree cover within agricultural landscapes; promoting indigenous, traditional and ecologically-based agriculture; and restoring degraded land (see Harvey, et al., 2008). However, this will likely require considerable institutional change in order to bring together functions that are commonly carried out by multiple, isolated government agencies.

Recommendation 4: Build adaptive capacity and develop adaptive management strategies

Finally and strongly related to the pursuit of integrated landscape management, policy makers need to build adaptive capacity in social-ecological systems and develop adaptive strategies to manage these systems. As Gunderson and Holling (2002) highlight, healthy social-ecological systems are sustainable when they are resilient to the disruptive impacts of external and internal disturbance. This is increasingly the case under the potentially destabilizing influence of globalization. In Costa Rica's dry North West, socioeconomic changes associated with globalization occurred very quickly. Furthermore, unanticipated and fast-paced socioeconomic changes continue in this region today. Since the conclusion of the present research, the global economic downturn has caused a sharp decline in the tourism industry in Guanacaste. As a result, labourers that were recently released from construction and hospitality employment are returning to agriculture. At the same time, the Costa Rican government's new National Food Plan promises to reinvigorate basic, traditional agriculture. In such a dynamic context, environmental conservation programs like PES cannot remain static. Program performance will vary depending on the surrounding socioeconomic conditions. As these conditions continue to change in unanticipated ways, program performance is likely to decline.

Managing dynamic social-ecological systems sustainably therefore requires adaptive management approaches that can respond quickly to changes in the system and adjust policies and programs accordingly. However, adaptive management is difficult to put into practice. It involves a major shift in the dominant natural resource management culture that exists in most countries (Allan & Curtis, 2005). Consequently, a move towards adaptive management will require a steep learning curve amongst all stakeholders and, potentially, major institutional change.

* * *

As noted in the introduction to this dissertation, researchers cannot stop at making recommendations to policy makers: they also have an important role to play in supporting policy makers to put these recommendations into practice. It is deceptively easy for researchers to recommend such far-reaching and complex actions, but it is far more difficult for policy makers to pursue them.

Despite the challenges, it is my hope that by addressing the above recommendations, policy makers and researchers can put actions in place that achieve greater outcomes for sustainability. The urgent and mounting need to confront the challenges of sustainability compels us to reconsider our approaches, no matter how great the difficulties in practice.

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Epilogue: Researcher positionality

Throughout the research process, I often reflected on how my own views and background might be influencing my research, and I adopted mechanisms to reduce any bias or misinterpretation that might have resulted (see Chapter 3). Regardless, who I am inevitably impacted the research process and outcomes. It likely impacted what research questions I asked, the methods I chose to use, how I related to my participants, how my participants related to me, the results I emphasized, and the contributions I sought to make.

In this short epilogue, I wish to explicitly position myself in the research and acknowledge some of the resulting impacts, particularly those arising in the field. In large part, however, it is necessarily left to the reader to evaluate for themselves how they feel my positionality may have shaped the research.

Who I am

I am female, white Caucasian, and at the time of doing my fieldwork, I was 34 years old. I was born in Tasmania, Australia and I am an Australian citizen. I am in a long-term relationship but I am not married, nor do I have children.

I have a rural background. I was raised on a small, family-operated sheep-and-cattle farm. I also worked "on the land" at various times throughout my teens and twenties. However, since the age of 25, I have lived, worked and studied mostly in cities. I still have a strong empathy with rural people and the challenges they face in making a living on the land.

I am educated and a social scientist. I have a Bachelor of Arts majoring in Political Science and Spanish; a Postgraduate Diploma in Political Science, a Master of Environment, and I am currently working towards a doctoral degree in Human Geography. While my Masters program was interdisciplinary, the bulk of my studies were in humanities and social sciences fields.

I consider myself to be environmentally-aware, and I love wild, "undomesticated" places. I endeavour to reduce my own ecological footprint as much as I can. I have been a member of a number of environmental organizations in the past and my political leanings are towards Green parties. In my spare time I seek out wild places to camp and hike. At times, my environmental leanings conflict with my rural background. I believe that this personal conflict is an important source of my research interest in issues of rural sustainability.

I also consider myself to be moderate and a pragmatist. In issues of social conflict, including environmental issues, I strive to see all sides of an argument and I seek out balance and compromise. I would rather facilitate solving problems in a practical way than advocate for a preferred solution or promote a particular world view.

I am somewhat familiar with Latin American cultures and societies, but not intimately. In addition to studying Latin American linguistics and literature at university, I spent one year traveling and working voluntarily in Central America in 1999. I would describe my spoken Spanish as sufficient or conversational, but not fluent.

Who I am in relation to my participants

In relation to the participants in my PhD research, I was first and foremost a cultural outsider. I was very obviously identified by everyone I met as foreign, Western and by extension as privileged. Many research participants used phrases such as "people like you" when speaking to me about North Americans, tourists, or foreigners in general.

Most of my participants were male and they certainly related to me as men interacting with a woman - specifically a white, Western woman. Most participants made efforts to be particularly charming and flattering, and many were in turn flattered by my interest in them. Some openly flirted. Many directly referred to me being a woman, for example asking me about a husband or boyfriend.

I actively tried to position myself as a student who was there to learn, rather than as an expert who was there to evaluate or tell people how to use land better. However, a number of participants referred to me as being more knowledgeable than themselves or their communities in general. In some cases, participants did not initially believe that they had any knowledge that I would find valuable. In one or two cases, people did not want to participate for this reason. A small number of other people were humbled or intimidated by me when I approached them. I did not pursue interviews in these cases.

I also actively tried to position myself as being from a rural and farming background. I hoped that this would help to partly overcome people's view of me as a privileged outsider and make them feel that I could understand their experiences a little better. I believe that many participants could feel my empathy for rural people and the challenges they faced. I also believe, or at least hope, that they were able to trust me and be more open with me as a result.

Research impacts

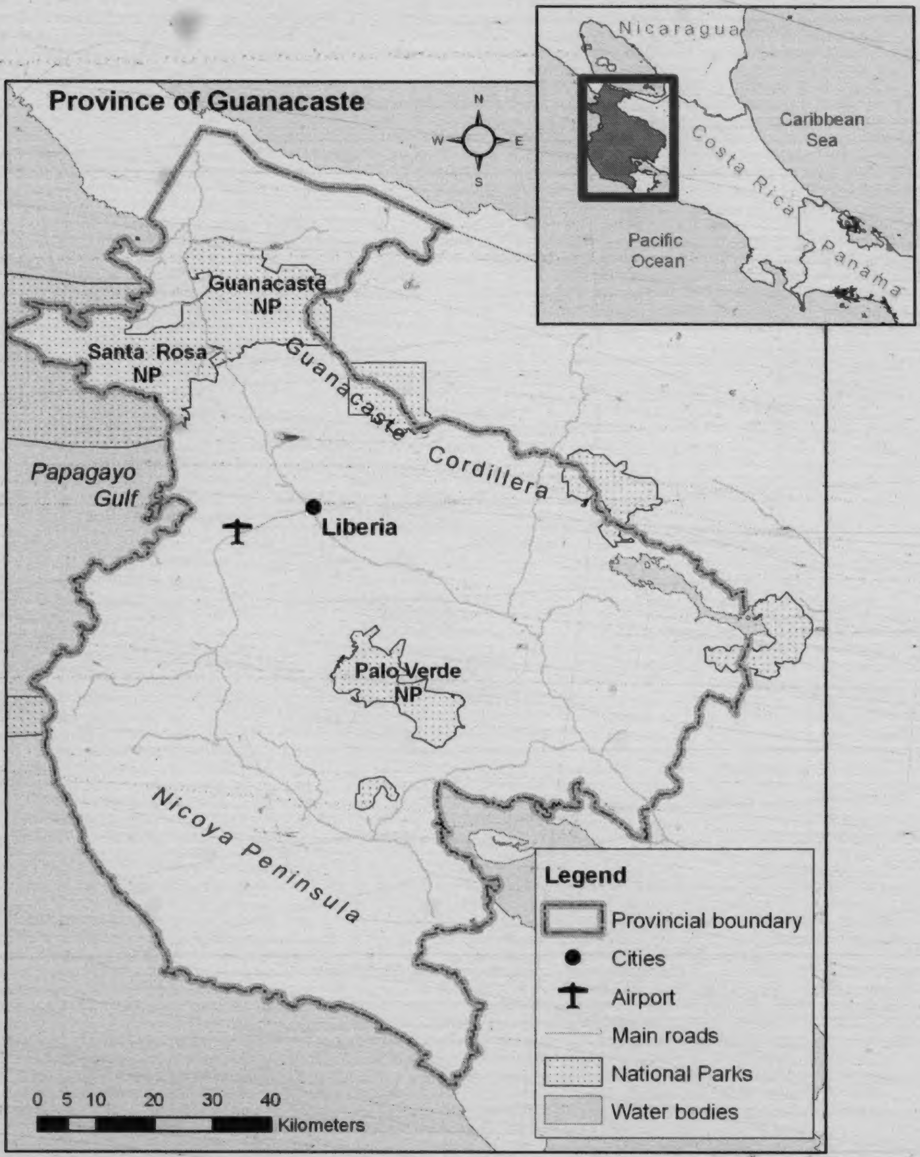
In the course of my fieldwork, I found that my positionality had both disadvantages and advantages. I cannot convey here all the many complexities of how my positionality did, or may have, impacted the research process and outcomes. However, I will give two illustrative examples.

First, a disadvantage of my positionality was that participants sometimes told me what they thought a white, Western, educated woman wanted to hear them say, or what such a person would approve of. For example, most participants presented themselves as being more environmentally aware than their neighbours. However, the tendency for people to misrepresent themselves in this way seemed to be most prevalent at the beginning of interviews before a good rapport had developed. I sought to counter this tendency in two ways. I asked people to talk in general terms about others in the community as well as about their own personal views, as they were less likely to over-represent the environmental awareness of others. I also left questions about environmental issues to the end of the interview to avoid them "flavouring" the rest of the discussions. Instead, I chose to begin with topics that were less value-laden, such as personal and community history, and farming activities.

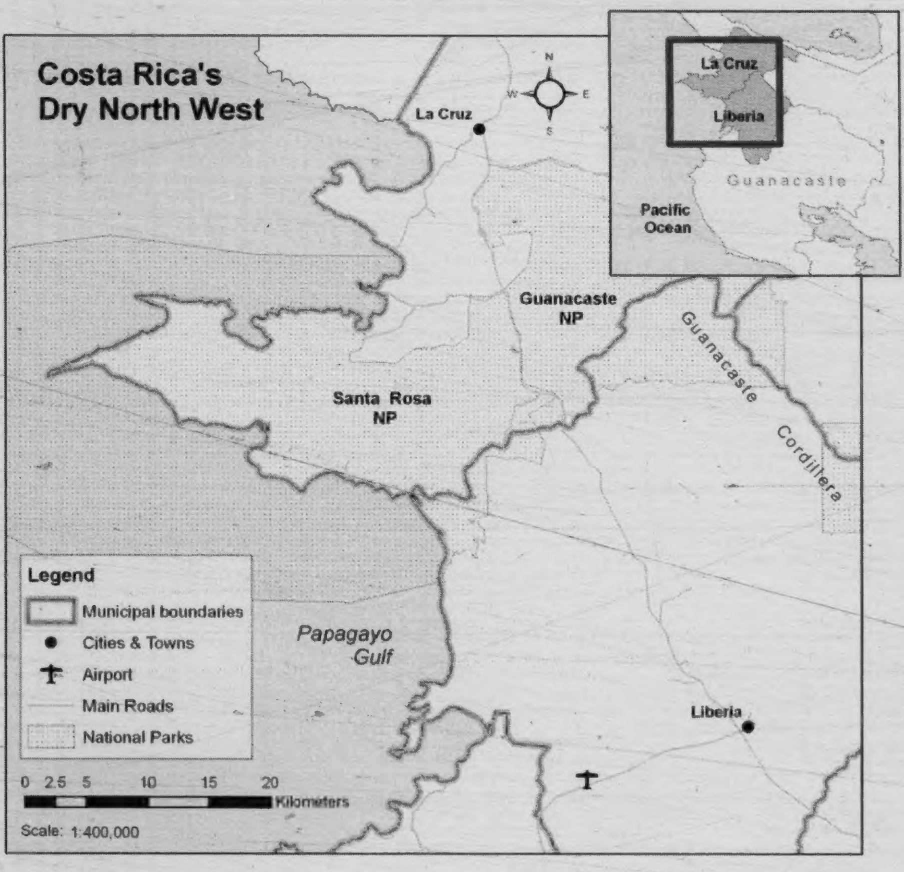
Second, an advantage of my position as a cultural outsider and my less-than-perfect Spanish was that participants made particular efforts to ensure that I understood their meanings. Some people accommodated me by expressing themselves in very simple and direct language. Others confirmed my understanding by making their point in a number of different ways or asking me to explain it back to them. I also felt that some participants assumed that I was better able to make sense of the complex land-use situation in their region than themselves or the government, perhaps because of my education. Consequently, some participants wanted to make sure that I had the information I needed to do this or to ensure that I understood their views in order to incorporate them into my findings.

Appendices

Appendix 1. Map of the province of Guanacaste, Costa Rica

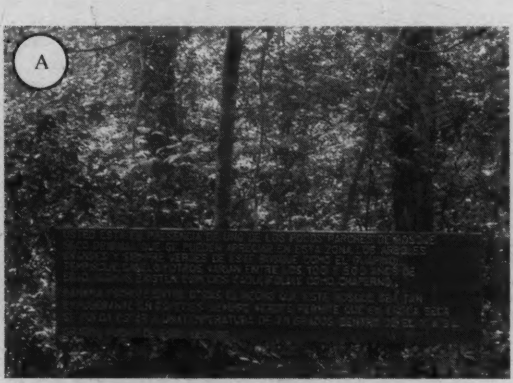

Province of Guanacaste
N
W
E
S
Nicaragua
Caribbean Sea
Costa Rica
Pacific Ocean
Panama
Guanacaste NP
Santa Rosa NP
Guanacaste Cordillera
Papagayo Gulf
Liberia
Palo Verde NP
Nicoya Peninsula
Legend
Provincial boundary
Cities
Airport
Main roads
National Parks
Water bodies
0 5 10 20 30 40
Kilometers

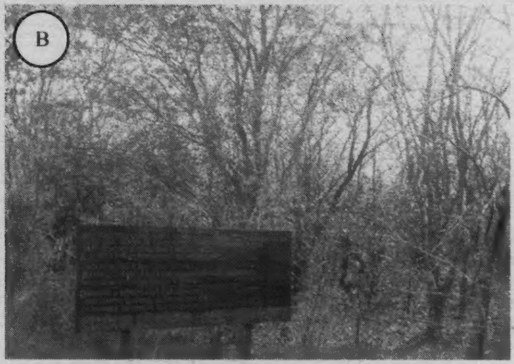
Appendix 2. Map of Costa Rica's dry North West

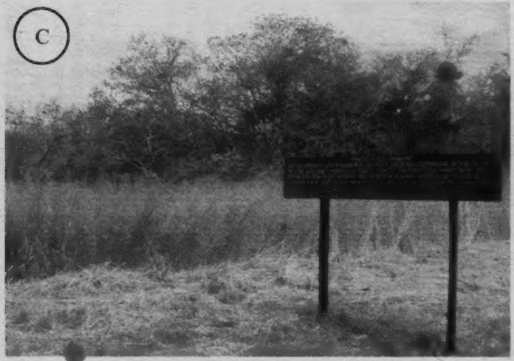

Costa Rica's Dry North West
N
W
E
S
La Cruz
Liberia
Guanacaste
Pacific Ocean
Guanacaste NP
Santa Rosa NP
Guanacaste Cordillera
Papagayo Gulf
Legend
Municipal boundaries
Cities & Towns
Airport
Main Roads
National Parks
0 2.5 5 10 15 20 Kilometers
Scale: 1:400,000

Appendix 3. Photos of the landscape in Costa Rica's dry North West

(**Note:** All photos were taken by the author in 2007)







The photos on this page were taken in the dry season at an educational display of different land cover types that is located along the entry road to Santa Rosa National Park.

They show:

(A) Primary tropical dry forest that has never been subjected to burning

(B) Young secondary tropical dry forest recovering from past burning

(C) Pasture that results from annual burning

The photos on this page show the landscape in different parts of Costa Rica's dry North West:

(D) Liberia municipality (wet season)

(E) La Cruz municipality (wet season)

(F) Santa Rosa National Park (dry season)

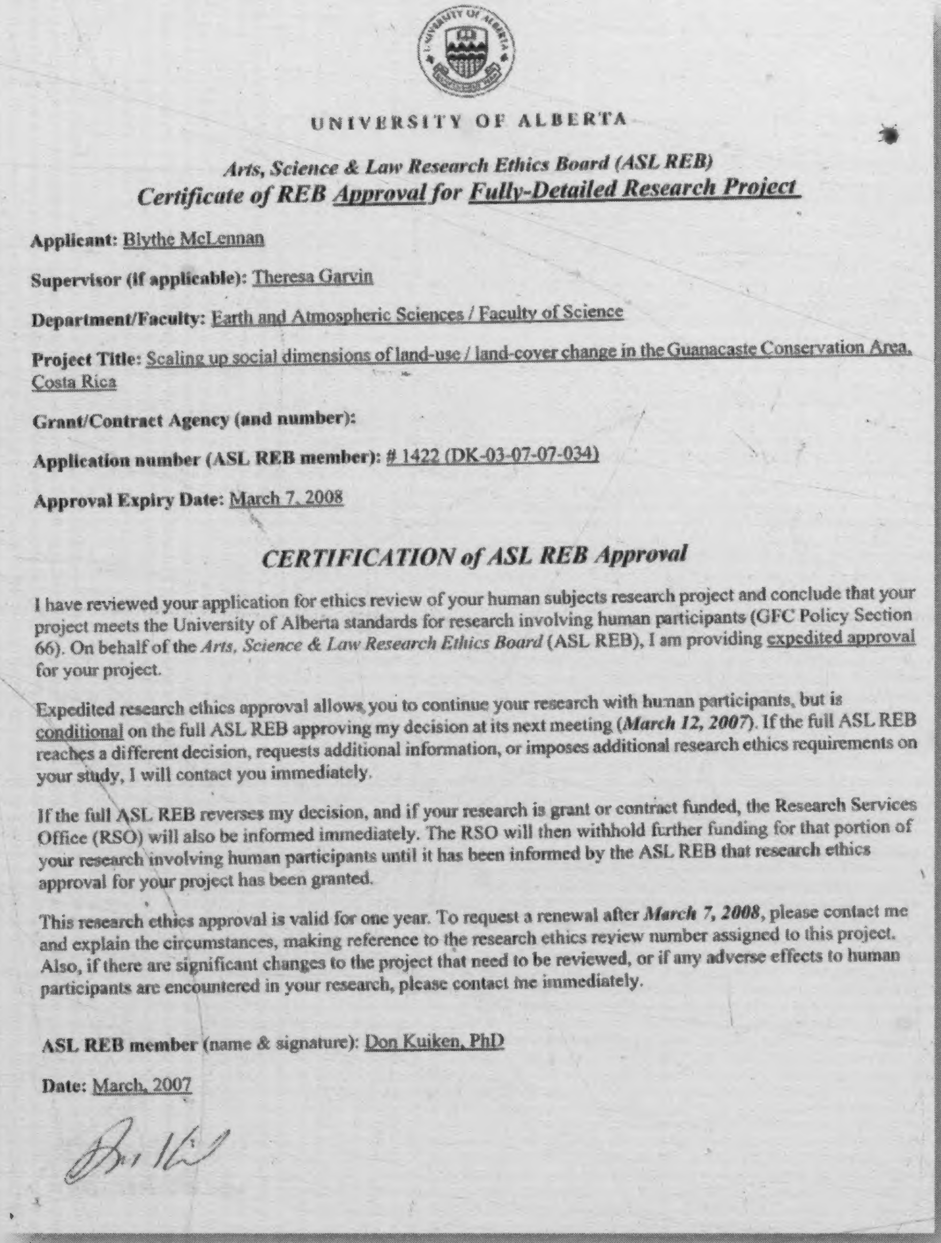
The final three photos show cattle-farming scenes:

(G) A small parcel in an *asentimiento* in La Cruz

(H) A medium-sized farm in La Cruz

(I) Cattle on show at an agricultural expo from a large breeding farm in Liberia

Appendix 4. Certificate of ethics approval



UNIVERSITY OF ALBERTA

Arts, Science & Law Research Ethics Board (ASL REB)

Certificate of REB Approval for Fully-Detailed Research Project

Applicant: Blythe McLennan

Supervisor (if applicable): Theresa Garvin

Department/Faculty: Earth and Atmospheric Sciences / Faculty of Science

Project Title: Scaling up social dimensions of land-use / land-cover change in the Guanacaste Conservation Area, Costa Rica

Grant/Contract Agency (and number):

Application number (ASL REB member): # 1422 (DK-03-07-07-034)

Approval Expiry Date: March 7, 2008

CERTIFICATION of ASL REB Approval

I have reviewed your application for ethics review of your human subjects research project and conclude that your project meets the University of Alberta standards for research involving human participants (GFC Policy Section 66). On behalf of the *Arts, Science & Law Research Ethics Board* (ASL REB), I am providing expedited approval for your project.

Expedited research ethics approval allows you to continue your research with human participants, but is conditional on the full ASL REB approving my decision at its next meeting (***March 12, 2007***). If the full ASL REB reaches a different decision, requests additional information, or imposes additional research ethics requirements on your study, I will contact you immediately.

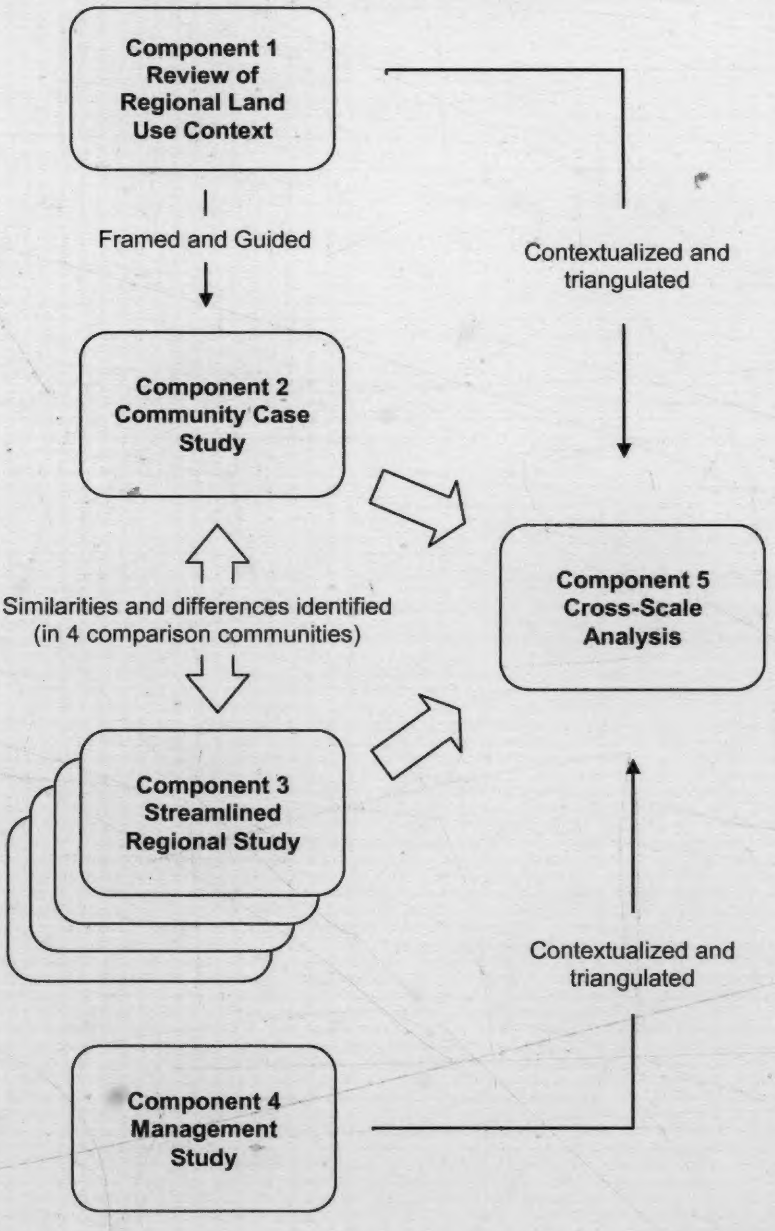
If the full ASL REB reverses my decision, and if your research is grant or contract funded, the Research Services Office (RSO) will also be informed immediately. The RSO will then withhold further funding for that portion of your research involving human participants until it has been informed by the ASL REB that research ethics approval for your project has been granted.

This research ethics approval is valid for one year. To request a renewal after ***March 7, 2008***, please contact me and explain the circumstances, making reference to the research ethics review number assigned to this project. Also, if there are significant changes to the project that need to be reviewed, or if any adverse effects to human participants are encountered in your research, please contact me immediately.

ASL REB member (name & signature): Don Kuiken, PhD

Date: March, 2007

Appendix 5. Outline of the trialed methodology


Component 1
Review of
Regional Land
Use Context
Framed and Guided
Contextualized and
triangulated
Component 2
Community Case
Study
Similarities and differences identified
(in 4 comparison communities)
Component 5
Cross-Scale
Analysis
Component 3
Streamlined
Regional Study
Contextualized and
triangulated
Component 4
Management
Study

Appendix 6. Information statement and informed consent form

(Note: Translated from Spanish)

Information about the Project

Project Title: Social factors that influence land-use change in the Guanacaste Conservation Area (ACG), Costa Rica

The Student: I am Blythe McLennan; in Costa Rica people call me "Jenny". I am a doctoral student from the University of Alberta in Canada.

Background: I am in the ACG from March to July 2007 to do a scientific research project. This work is part of my doctoral course in Human Geography and forms part of a scientific research network called Tropi-Dry (http://tropi_dry.eas.ualberta.ca). The objective of Tropi-Dry is to facilitate collaboration between scientists that work in natural and social sciences to understand the state of tropical dry forests in the Americas. Tropi-Dry involves scientists from five countries. The coordinator of Tropi-Dry in Costa Rica is Ingeniero Julio Calvo Alvarado from the Costa Rican Institute of Technology.

Objectives: I am interested in studying forest management with the purpose of protecting forest and supporting the subsistence of the people who have forest on their land and live nearby. I want to understand how people decide to change how they use their land and their forest. Particularly, I want to know what social factors influence decisions to have or not have forest on private land. Also, I want to understand how forest conservation on private land impacts the lives of land owners. Furthermore, I want to study the actions of government and non-government agencies that influence land use. I would like to understand all these topics by interviewing land owners, government officials, and representatives of community and producer groups.

I hope that my project can increase our knowledge of tropical dry forests in the ACG. Also, I hope that the results can support government and other groups in Costa Rica, Canada and other countries to make decisions about forest management that also improve people's quality of life.

Methods: If you choose to participate in my project, I will ask you some questions in an interview. You can answer with your own words and there are no wrong answers. You have the right to not answer any particular question. I would like to record the interview so I can remember what you told me later. I will ask questions about your role in the use and management of the land, the history of land use, the benefits of forests to landowners, and about government programs. The interview could take one to one and a half hours to complete. After the interview, I may ask if I can do a second interview later. The reason is that sometimes I think of more important questions afterwards. If you agree to a second interview, it will be about 30 minutes long.

Possible Risks and Benefits: There are no risks associated with this project. There may not be any direct benefit to you from participating in this project. However, it offers you the opportunity to give information anonymously to government agencies that manage forest in your area, and to the researchers who study forests.

Confidentiality: All the information or data that can be related to you will be managed confidentially. To do this, I will take the following measures: I will copy the words of your interview onto paper. On the paper, I will use an identification number in place of your name that only I can use to identify you. I will store the recordings and the attached consent form for no longer than 5 years and during that time I will keep it securely in my office at the university. After 5 years, I will destroy the interviews.

Voluntary Participation: At any moment you can decide that you don't want to participate in the project, or that you don't want me to use what you told me in the interview. You can decide this before, during or after the interview. If you tell me that you don't want me to use what you said, I will destroy the recording and the paper copy of your interview. There is no problem in deciding this at any moment, and there is no penalization for it. I will provide my contact details in Costa Rica and in Canada so that you can contact me at any time, even after I have returned to Canada.

Use of the Information: I will use the information from all the interviews in a report, written in Spanish and English. Next year I hope to be able to return to the ACG so that you can review the report. If you like, I can show you what I have included from your interview in my report. In this way I will be able to confirm that I understood you correctly. If I didn't, I will change the report. If you wish, I can send you a copy of the report. I also hope to present the report to interested groups. As the report represents the perspectives and opinions of different people, I can't guarantee that you will be in complete agreement with all the information that appears in it.

I will use what you tell me to write my doctoral thesis. The thesis is a report that the university requires me to write. Also, I will publish the project results in academic journals and I will present them at public conferences in Costa Rica and other countries.

My supervisors may decide to use part of my project in studies conducted by the investigative network of Tropi-Dry.

No report, presentation or published article will include your name or any information that could identify who you are.

Contact Details: If you have a question about the study or you would like more information, please contact the student or the student's supervisors.

To communicate with the student (Blythe McLennan):

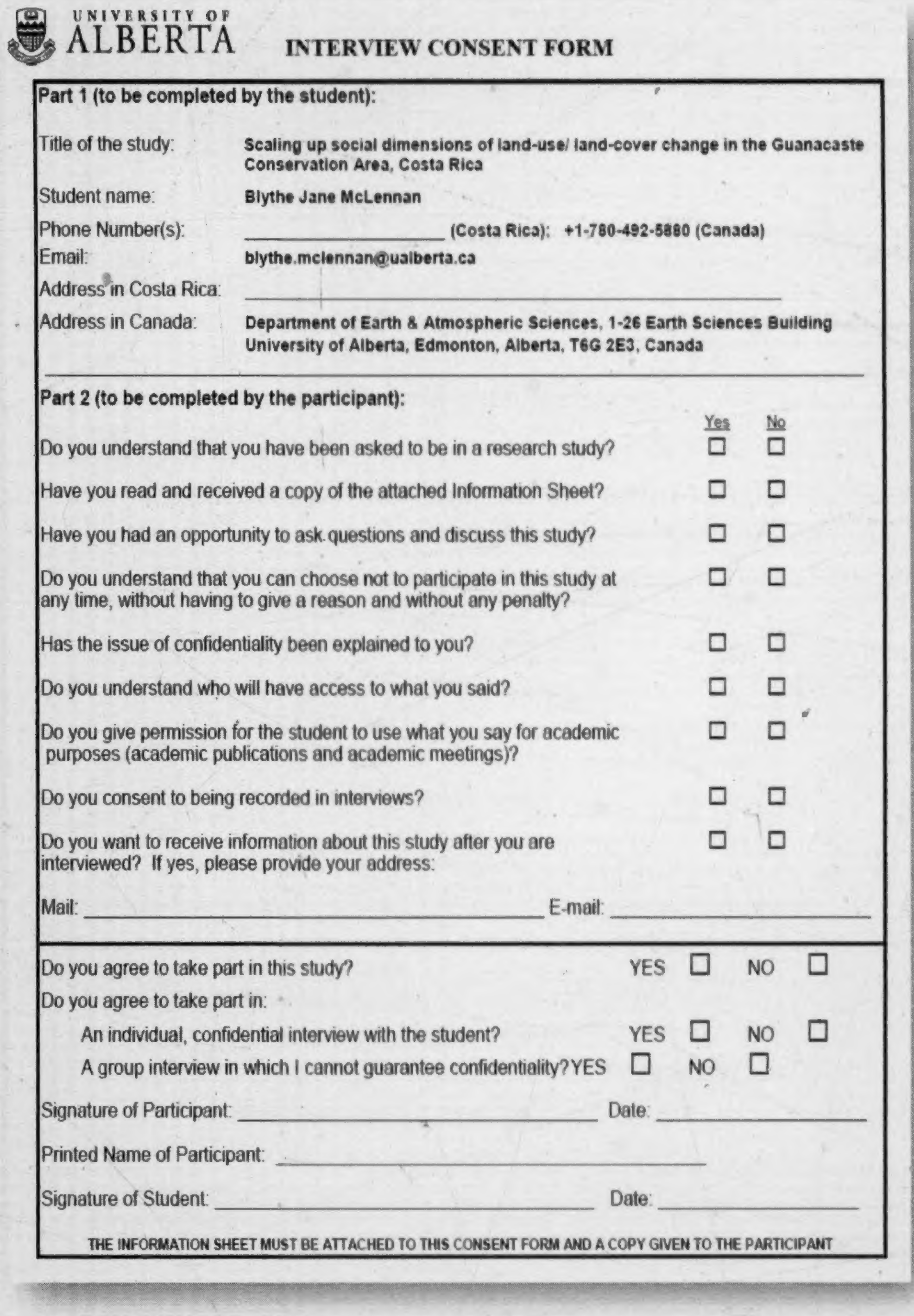
In Costa Rica: *(March-July 2007)*	***In Canada:*** *(After July)*
Email: blythe.mclennan@ualberta.ca By telephone: +506-666-3510 By mail: De la oficina de correos 200 metros al norte y 150 metros al este Barrio Los Ángeles, Liberia, Guanacaste, Costa Rica	Email: blythe.mclennan@ualberta.ca By telephone: +1 (780) 492-5880 By mail: Department of Earth & Atmospheric Sciences 1-26 Earth Sciences Building University of Alberta Edmonton, Alberta, T6G 2E3 Canada

To communicate with the supervisors: Professor Theresa Garvin or Professor Arturo Sánchez-Azofeifa:

Email: Theresa.Garvin@ualberta.ca , Arturo.Sanchez@ualberta.ca

By telephone: +1 (780) 492-5880

By mail: Department of Earth & Atmospheric Sciences
1-26 Earth Sciences Building
University of Alberta
Edmonton, Alberta, Canada T6G 2E3



UNIVERSITY OF ALBERTA

INTERVIEW CONSENT FORM

Part 1 (to be completed by the student):

Title of the study: **Scaling up social dimensions of land-use/ land-cover change in the Guanacaste Conservation Area, Costa Rica**

Student name: **Blythe Jane McLennan**

Phone Number(s): ____________ **(Costa Rica); +1-780-492-5880 (Canada)**

Email: **blythe.mclennan@ualberta.ca**

Address in Costa Rica: ____________

Address in Canada: **Department of Earth & Atmospheric Sciences, 1-26 Earth Sciences Building**
University of Alberta, Edmonton, Alberta, T6G 2E3, Canada

Part 2 (to be completed by the participant):

	Yes	No
Do you understand that you have been asked to be in a research study?	☐	☐
Have you read and received a copy of the attached Information Sheet?	☐	☐
Have you had an opportunity to ask questions and discuss this study?	☐	☐
Do you understand that you can choose not to participate in this study at any time, without having to give a reason and without any penalty?	☐	☐
Has the issue of confidentiality been explained to you?	☐	☐
Do you understand who will have access to what you said?	☐	☐
Do you give permission for the student to use what you say for academic purposes (academic publications and academic meetings)?	☐	☐
Do you consent to being recorded in interviews?	☐	☐
Do you want to receive information about this study after you are interviewed? If yes, please provide your address:	☐	☐

Mail: ____________ E-mail: ____________

Do you agree to take part in this study? YES ☐ NO ☐

Do you agree to take part in:

An individual, confidential interview with the student? YES ☐ NO ☐

A group interview in which I cannot guarantee confidentiality? YES ☐ NO ☐

Signature of Participant: ____________ Date: ____________

Printed Name of Participant: ____________

Signature of Student: ____________ Date: ____________

THE INFORMATION SHEET MUST BE ATTACHED TO THIS CONSENT FORM AND A COPY GIVEN TO THE PARTICIPANT

Appendix 7. Interview guide: Component 2 (In-depth community study)

(**Note:** Translated from Spanish)

Introduction

- Introduce myself, the study – purpose, use of data etc.
- Thank you for time, overview of what the interview will be about

  Discuss consent, anonymity, participation.

The Participant

1. Can you tell me a little about yourself, your family and your farm?
   - ***Self:*** Age, occupation, education, time living here/ working here, involvement in community organizations
   - ***Family:*** Where from, size, are children living here or away
   - ***Farm:*** Size, activities, how/ when you got it

History (community, land use)

I would like to know about the history of this community and how the land was used in the past.

2. What do you know about the history of this community? How was it founded?
3. How has the community changed?
   - Population, roads, schools, electricity
4. What was the land used for in the past?
   - Haciendas, subsistence agriculture, commercial agriculture, timber extraction
5. Were there any conflicts over the land in the past?

The community and livelihoods

Now I'd like to talk about the community here.

6. How many people live in this community today?
7. Has the population changed very much?
   - New people come here to live? Where from?
   - Do people leave the community to live somewhere else?
8. What work do people do here? Has work changed over time?
9. What do young people do when they finish at school?

10. What are the best/ worst things about living here?
11. What community organizations exist? What do they do? Who is involved with them?
    - Community Development Association, fire brigade, environmental, community development, other
12. Is there any tourism here?
    - Employment, benefits, disadvantages, who is involved in tourism

Land Use Change

13. Who owns the land here?
    - Farm sizes
    - Locations
    - Young people
14. What do these people use land for?
    - Cattle, subsistence agriculture, commercial agriculture, timber extraction, tourism, forest reserves, timber plantations, other
15. Have the methods for farming changed? New techniques or technology?
16. What events have been important for influencing how people use land/land-use change? When did they happen?
17. Do farmers live off the land or do they have other work?
18. What challenges do farmers face?

Land management and forest conservation

19. What government agencies or other organizations influence farming and land use? What do they do?
    - MAG, MINAE, IDA, Agriculture Centre, municipality, Community Development Association, Producer's Associations, Cattlemen's Chamber, others.
20. Who in the community is involved in these organizations?
21. Policies and programs?
    - Technical/ financial assistance, conservation, PES, community development, economic development, education/ capacity-building
22. What do you know about PES? Experiences with, opinion of.
23. What do you know about the timber-cutting permits? Experiences with, opinions of
24. What is like living near the national parks? Problems, benefits, relationships with park managers.

Environmental change and perceptions

25. How has the natural environment in this area changed?
    - Forest, water/rain, temperature, soil, animals
26. Is there more or less forest than in the past? Where is it?
27. What do the people in the community think about the natural environment?
    - What value does it have? Who for?
    - Do people get any benefits from forests? (Timber, foods, cattle feed, recreation etc)
28. Do you agree?
29. Do people think differently now from in the past? How?
30. Are there any community projects to protect the natural environment?

The Future

Now I'd like to talk about the future here.

31. What do you think will happen here in the future? How do you think the community will change?
32. How would you like the future to be?
33. What are the biggest challenges this community faces in the future?
34. What could the government do to help this community?
35. What could the community or others do?

Close

36. Is the experience in this community different from other nearby communities?
37. Who would have a different perspective on these things from you?
38. Who else do you think I should talk to?
39. Other comments or questions

Appendix 8. Interview guide: Component 3 (Streamlined regional study)

(Note: Translated from Spanish)

Introduction

- Introduce myself, the study – purpose, use of data etc.
- Thank you for time, overview of what the interview will be about

  Discuss consent, anonymity, participation.

Part A: Open

The Participant

1. Can you tell me a little about yourself, your family and your farm?
   - ***Self:*** Age, occupation, education, time living here/ working here, involvement in community organizations
   - ***Family:*** Where from, size, are children living here or away
   - ***Farm:*** Size, activities, how/ when you got it

History (Community, Land Use)

I would like to know about the history of this community and about how land was used in the past.

2. What do you know about the history of this community? How has the community changed?
3. How was the land used in the past?

The Community and Land Use Today

Now I'd like to talk about the community and land use today.

4. What work do people do here?
5. What are the best/ worst things about living here?
6. How do people use land today?
7. Who owns the land?
8. Have the methods for farming changed? New techniques or technology?
9. What challenges do farmers face?
10. What events have been important for influencing how people use land/land-use change? When did they happen?
11. What government agencies or other organizations influence community

development and/or land use? How?

- MAG, MINAE, IDA, Agriculture Centre, municipality, Community Development Association, Producer's Associations, Cattlemen's Chamber, others.

12. What do you know about PES/ timber-cutting permits/ national parks?
    - Experiences with, opinions of
13. How has the environment changed? Why?
    - Forest, water/rain, temperature, soil, animals
14. Is there more or less forest than in the past? Where is it?

Part B: Targeted

Challenges and Problems

Now I'd like to read a list of challenges and problems that I know exist in other communities in this region. Do you believe they exist in your community as well? *[Only include relevant topics not already mentioned by participant*]

15. Farming/ Land Use:

- Difficult to make a living farming
- Rising costs of farming
- Nowhere to sell produce
- Dry climate/ lack of water
- Fires/ burning
- The high price of land
- Foreigners buying land
- National parks - restrict land access/ hunting/ relations with the park
- Illegal logging
- Timber-cutting permits too restrictive, unevenly applied

16. Community Development/ Livelihoods:

- Not enough work
- Having to travel a long way to get work
- Too many people
- Relations with government agencies – don't do anything, corruption, restrictive laws, less support compared to the past
- Environmental problems – deforestation, rubbish, soil fertility loss, erosion
- Difficulty of community organization, lack of coordination

- Social problems – materialism, idleness in the youth, drugs, not knowing how to manage money (e.g. after selling land)
- Tourism (or lack of it) – is it a good or bad thing?
- Accessing opportunities in tourism & other employment - capacity/ skills
- Educating the youth
- Lack of transport (access to education, work)
- Rising costs of living

17. Other Challenges and Problems

- Are there other challenges or problems here for farmers and the community that we haven't discussed?
- Are there efforts or projects to address these challenges?
- Who is directing them? Do they work well?
- What things make these efforts difficult? How could they be improved?
- Does this community have other challenges that we haven't talked about?

Part C: Close

The Future

18. What do you think will happen here in the future? How will the community change?
19. What does the community needs to improve well-being and develop the town?

Closing

20. Is the experience in this community different from other nearby communities?
21. Who would have a different perspective on things from you?
22. Who else do you think I should talk to?
23. Other comments or questions

Appendix 9. Interview guide: Component 4 (Management study)

(**Notes:** Translated from Spanish; Interviews were targeted to the areas of knowledge of each management/ industry representative. Consequently, not every topic area listed in this interview guide was included in each interview.)

Introduction

- Introduce myself, the study – purpose, use of data etc.
- Thank you for time, overview of what the interview will be about
- Discuss consent, anonymity, participation.

Overview of the participant and agency/organization

1. Can you tell me about your involvement in this agency/organization?
    - Position, duration, time spent in this region
2. Can you tell me a little about this agency/organization?
    - Responsibilities, key policies programs
3. What is the specific role of this office?
4. How is your agency/organization involved in land use and/or conservation?

The Region

5. What are the key economic activities in this region today?
    - Cattle-farming, tourism, commerce, agriculture, other
6. What are the main sources of employment?
7. How has the region changed?
    - Population, employment, natural environment, infrastructure (roads, electricity, etc), etc.
8. What are the key challenges the region faces today?

Land-use

Now I'd like to talk about how people use land, both today and in the past.

9. How was land used here in the past?
    - Subsistence agriculture; Cattle-farming, (dairy/beef); Land users – small/large, campesinos, hacendados etc.; Commercial agriculture; Timber; Other
10. Is land used differently today? How?

11. Who has land today? How do they each use it?
    - Farmers, tourism operations, foreigners, developers, protected areas
12. Have farming methods changed? How?
13. Do farmers have forest on their land?
    - Primary/ secondary/plantation?
    - Is the amount of forest changing?
    - For what purpose?
14. Are there a lot of land sales?
15. What kinds of regional conditions/processes have influenced the way people use land?
    - Biophysical/ water access
    - Economic markets
    - Government policies/ programs
    - National parks, timber-cutting permits, PES
    - Tourism, foreigners, land prices
    - Other
16. What challenges do farmers face today?
    - Market change, land access, water access, income, other

Environmental Change

I'd like to talk a little bit about the natural environment and how it has changed over time.

17. Have changes in the way people use land caused environmental change? Can you describe how?
18. In general, how has the natural environment changed here over time?
    - Climate; Animals and plants; Water, rivers, rain; Forest

Government and other agencies/organizations

I'm also interested in how government agencies and organizations other than your own influence land use.

19. What other government agencies influence land use? How (policies and programs)?
    - MINAE, ACG Council, MAG, IDA, Agricultural Centres, DINADECO, municipalities, others?
20. What other organizations influence land use? How?
    - Guanacaste Cattlemen's Chamber, CORFOGA, Community Development Associations, fire brigades, environmental groups, NGOS, others
21. Does your agency/ organization work with any of these groups? How?

The Future

Now I'd like to ask you about the future of this region.

22. How do you think the region will change in the next 5/ 10 years?
    - Land use, environmental conservation, economy, society, government role, tourism, other.
23. What do you see as the big challenges for the region in the future?

Close

- Is there anything else you would like to tell me about the things we have been discussing?
- Do you know who else I should speak to?
- Thank you and follow-up

Appendix 10. Participant Characteristics

Table 10-1: Landholder and community leader characteristics

(*Note:* To protect participant confidentiality, personal and property characteristics are provided in approximate terms only)

	Personal characteristics								**Property characteristics**			
ID †	**Primary occupation**	**Sex**	**Age**	**Origin**	**Formal Education**	**Wealth**	**Off-farm income**	**Networks**	**Farm size**	**Land acquired**	**Agricultural land uses**	**Forest & timber use**
Ref01	Agricultural labourer, former cattle farmer	M	50s	Local	None	Low	Yes	None	Small (former family)	IDA	Cattle, subsistence crops	None
Ref02	Cattle farmer	F	60s	Local	Secondary	Low-Medium	No	None	Small	IDA	Cattle, subsistence crops	Plantation, formerly with IDA incentives
Ref03 *	Cattle farmer	M	60s	Local	None	Low	No	None	Small	IDA	Cattle, subsistence crops	None
Ref04 (CL)	Services	F	40s	Local	Secondary	Low-Medium	Yes	Community groups	N/A			
Ref05 *	Services	M	50s	International	Tertiary	High	Yes	None	Small	Purchase	N/A	None
Ref06	Services	M	30s	Local	Secondary	Medium	Yes	None	Small	IDA	Cattle (own use only)	None
Ref07	Services, cattle farmer	M	70s	Local	Primary	Medium	Yes	Community groups	Small	IDA	Cattle	Small reserve, no PES

	Personal characteristics								Property characteristics			
ID †	**Primary occupation**	**Sex**	**Age**	**Origin**	**Formal Education**	**Wealth**	**Off-farm income**	**Networks**	**Farm size**	**Land acquired**	**Agricultural land uses**	**Forest & timber use**
Ref08 *	Cattle farmer	M	80s	Local	None	Low	No	None	Small	IDA	Cattle, subsistence crops	
Ref09	Cattle farmer	M	80s	Local	None	Low-medium	Yes (from children)	Community groups	Small	IDA	Cattle, subsistence crops	Small reserve, no PES
Ref10	Services	M	30s	Local	Secondary	Medium	Yes	None	Small	IDA	Cattle, subsistence crops	Small reserve, no PES
Ref11	Services	M	50s	International	Tertiary	High	Yes	None	Medium	Purchase	Cattle	None
Ref12	Retired cattle farmer	M	70s	Local	None	Low-medium	No	Community groups, cattlemen associations	Small (former farm)	IDA	Cattle	Plantation, formerly with IDA incentives
Ref13	Fisherman	M	50s	Local	Unknown	Medium	Yes	Community groups	Small	IDA	None	None
Ref14	Agricultural labourer	M	50s	Local	None	Low-medium	Yes	None	N/A			
Ref15 (CL)	Services	M	50s	Local	Tertiary	High	Yes	Community groups	N/A			
cA1	Cattle farmer	M	70s	Nicaragua	None	Low-medium	No	None	Small-medium	IDA & purchase	Cattle, subsistence crops	None
cA2	Fishing, former cattle farmer	M	70s	Nicaragua	None	Low	Yes	None	Small (formerly)	IDA	Cattle	None

	Personal characteristics								**Property characteristics**			
ID †	**Primary occupation**	**Sex**	**Age**	**Origin**	**Formal Education**	**Wealth**	**Off-farm income**	**Networks**	**Farm size**	**Land acquired**	**Agricultural land uses**	**Forest & timber use**
cA3	Cattle farmer	M	70s	Nicaragua	None	Low	Yes (from children)	None	Small	IDA	Cattle, subsistence crops	
*cA4**	Services, former cattle farmer	M	80s	Local or Nicaragua	None	Low-medium	Yes	None	Small	IDA	Cattle, subsistence crops	None
cA5 (CL)	Services	F	40s	Local	Secondary	Medium	Yes	Community groups	Small	IDA	Cattle	Reserve, no PES
cB1	Cattle farmer	M	50s	Local	Secondary	Medium	Yes (formerly)	Community groups, cattlemen associations	Medium	Inherited	Cattle, subsistence crops	Reserve with PES
cB2	Cattle farmer	M	50s	Local	Tertiary	High	Yes (formerly)	Cattlemen associations	Medium	Inherited & purchase	Cattle	Reserve, no PES
*cB3**	Cattle farmer	M	50s	Local	Tertiary	High	Yes	Cattlemen associations	Medium	Inherited	Cattle	Reserve, formerly with PES
cB4 (CL)	Retired	F	70s	Local	Primary or Secondary	Medium	Yes (formerly)	Community groups	N/A			
cB5	Cattle farmer	F	40s	Local	Primary or Secondary	Low-medium	Yes	Community groups	Small	IDA	Cattle, subsistence crops	None

	Personal characteristics								Property characteristics			
ID †	**Primary occupation**	**Sex**	**Age**	**Origin**	**Formal Education**	**Wealth**	**Off-farm income**	**Networks**	**Farm size**	**Land acquired**	**Agricultural land uses**	**Forest & timber use**
cC1 (CL)	Services	M	40s	Local	Tertiary	Medium-High	Yes	Community groups, cattlemen associations	Medium	Purchase	Cattle	None
*cC2**	Retired farmer	M	70s	Local	None	Low	No	None	Small (formerly)	IDA	Cattle	None
cC3	Semi-retired farmer	M	50s	Local	Tertiary	Medium-High	Yes (formerly)	Community groups, cattlemen associations	Medium	Purchase	Cattle	None
cC4	Cattle farmer	M	60s	Local	Tertiary	Medium	Yes	Community groups, cattlemen associations	Medium	Purchase	Cattle, commercial crops	Reserve, no PES
cC5 (CL)	Retired	M	70s	Local	Tertiary	Low-medium	No	Community groups	N/A			
cD1	Cattle and crop farmer	M	50s	Local	Tertiary	Medium-High	Yes (formerly)	Cattlemen associations	Medium	Purchase	Cattle, commercial crops	None
cD2	Cattle and services	M	70s	Local	Primary or Secondary	High	Yes	Community groups, Cattlemen associations	Medium	Inherited	Cattle, commercial crops, tourism	Reserve, formerly with PES

* Wife was also present and participated in the interview † (CL) denotes participant was a community leader

Table 10-2: Management and industry representatives interviewed

(**Note:** The participant's role in the organization/agency is not included to protect confidentiality)

ID	**Organization/agency**	**Level of government/management unit**
M1	La Cruz municipal government	La Cruz Municipality
M2	Ministry of Agriculture and Livestock (MAG)	La Cruz Municipality
M3	Agricultural Centre	La Cruz Municipality
M4	National Directorate for Community Development (DINADECO)	Liberia and La Cruz Municipalities
M5	Federation of Guanacaste Cattlemen's Chambers	Guanacaste Province
M6	Confraternidad Guancasteca (environmental organization)	Guanacaste Province
M7	National Production Council (CNP)	Guanacaste Province
M8	Real estate agency	Guanacaste Province
M9	Ministry of Environment and Energy (MINAE)	Guanacaste Conservation Area
M10	Institute of Agrarian Development (IDA)	Guanacaste Province
M11	Timber industry	Guanacaste Province
M12	Santa Rosa National Park Centre for Investigation	Guanacaste Conservation Area

Appendix 11. Analysis framework

Category	**Item**	**Elements/ examples**
History	Personal	Individual characteristics, family history, time & activities in the area, off-farm income, community & organization involvement
	Community	Foundation, population/ immigration, land use, infrastructure/services, economy, social organization, living conditions
Farm Activities		Traditional cattle raising, modernized cattle raising, dairy, subsistence agriculture, reserves (with/without PES), plantations (with/without PES), commercial crops, mixed use, waiting to sell, tourism/urban development, other
Land Use Change	Land use change trajectories - personal	Abandonment, sale, forest protection, plantations, innovate/diversify, clearing, maintain
	Land use change trajectories - community	Abandonment, sale, forest protection, plantations, innovate/diversify, clearing, maintain
Economic Activities - Community	Off-farms	Farm labour (cattle, other), fishing, construction, tourism employment, commercial/ service industries, own businesses, agricultural commerce, professional, other
Economic & Development Issues		Lack of planning, govt corruption, employment scarcity, lack of human capacity/education, foreign ownership/ land prices, lack of government support, lack of govt resources, poverty/ lack of capital, biophysical, lack of investment, Free Trade Agreement, other
Society/ Social Interactions	Activities of community organization	ADI, environmental, productive assoc (fishing, cattlemen, producers), other
	Activities of govt agencies	MINAE, MAG, IDA, ACG Regional Council, DINADECO, municipality, municipal agricultural centre, other
	Relationships & interaction	Community/govt agencies; within community, amongst landholders, intergenerational, community/NP, community development projects
	Attitudes, opinions, perspectives	Individualism, cooperation, trust/mistrust, positive/negative attitudes, community development, historical relationships

Environmental Change	Deforestation	Change, causes, impacts
	Forest regrowth	Change, causes, impacts
	Water	Change, causes, impacts
	Climate	Change, causes, impacts
	Wildlife	Change, causes, impacts
	Other	Change, causes, impacts
Conservation programs	PES – protection	Personal experience, community experience, opinion of, problems with, management of, suggestions
	PES - reforestation	Personal experience, community experience, opinion of, problems with, management of, suggestions
	Land use permits	Personal experience, community experience, opinion of, problems with, management of, suggestions
	National parks/ACG	Personal experience, community experience, opinion of, problems with, management of, suggestions
Environmental awareness	Personal	Opinions/ attitudes
	Community	Opinions/ attitudes
Environmental problems	Problems	Litter, water pollution, landslides, deforestation, water scarcity, biodiversity loss, soil fertility loss, fire, El Nino/global climate change, hunting, other
Drivers of land use change – categories (*to cross against types of land use change trajectories)*	Legal & policies	Restrictive laws, land tenure, existence of NPs, no financial assistance
	Government offices	Corruption, PES delivery, lack of support, poor performance
	Economic	Lack of capital, poverty, cost of living, expense, markets/prices, access to off-farm income
	Relationships & society	Fire lighting/hunting, culture/values, PES undesirable, unemployment/idleness,
	Individual characteristics, attitudes, preferences	Low education/capacity, resentment to parks, access to information, involvement in organizations, lifestyle preferences, age/retirement, health
	Geographic/ locational	Isolated, coastal, tourism location, proximity to urban centre, access to transportation
	Biophysical	Water, terrain/soil, climate
	Family lifecycle	Age, children leaving, lifestyle aspirations,

	Globalization/ modernization	Land sales, foreigners, TLC, currency exchange, rising cost of living, impact on lifestyle aspirations, tourism employment, materialism
	History & events	Expropriation, NP creation, marine park, tourism arriving, beef price drop
"Big" Themes		Conservation is imposed/ restricts/ extreme, govt restricts, we are abandoned, need for balance/sustainable use, lack of planning, need for capacity-building, no options, optimism/ pessimism, globalization/ modernization, unfair/unequal, management not done right, patronizing relations govt/rural communities, uncertainty
Future & "Hay Que"	Images of the future	Visions of, hopes for, predictions about land-use change & human development
	Suggestions for what is needed	Development, conservation, capacity-building, land-use planning, education